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THE JOURNAL OF PERIODONTOLOGY is published to serve as the professional journal of periodontia; to keep dentists in touch with research being carried on in this field and related sciences; to stimulate greater interest in the supporting tissues of the teeth and their relation to oral and general health.

The Journal is the official organ of the American Academy of Periodontology and will contain, therefore, papers of scientific and clinical interest which are presented at the annual meetings of that society, as well as articles submitted direct to the Editor. Obviously opinions expressed do not necessarily represent those of the Editor or the American Academy of Periodontology.

Next Annual Meeting

THE AMERICAN ACADEMY OF PERIODONTOLOGY

September 27, 28, 29, 1956

Atlantic City, N. J.

1956 Spring Conference

of

THE AMERICAN ACADEMY OF PERIODONTOLOGY

Ann Arbor, Michigan

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ROBERT G. KESEL, D.D.S., M.S.

President 1955-56

American Academy of Periodontology

Dr. Robert G. Kesel, renowned and respected Professor and Head of the Department of Applied Materia Medica and Therapeutics of the University of Illinois College of Dentistry was installed as President of the American Academy of Periodontology in San Francisco, California during the Academy's 1955 meeting. Dr. Kesel has earned this honor because of his many contributions to scientific journals and because of his numerous activities in organized dentistry, including the presidency of the Illinois State Dental Society. The influence of the Academy will surely expand under Dr. Kesel's wise guidance.

THE JOURNAL OF PERIODONTOLOGY

JANUARY, NINETEEN HUNDRED FIFTY-SIX

Orthodontic Procedures in the Care of the Periodontal Patient

by MAX SHAPIRO,* D.D.S., *Beverly Hills, Calif.*

PERIODONTAL treatment is becoming increasingly complex as our knowledge of the disease increases. Frequently, it is necessary to use procedures from other specialties to treat the periodontal patient successfully. An example, is the use of splinting procedures[1-3] which are part of operative and prosthetic dentistry. Frequently, it also becomes necessary to borrow from the wealth of knowledge the orthodontist has accumulated to create a more hygienic periodontal condition, or a periodontal condition which is more amenable to therapy. This paper will discuss simple procedures which can be utilized by the general practitioner as well as the periodontist and orthodontist.

To treat periodontal disease successfully, it is necessary to place the tissues in a state of health, and to achieve conditions in the teeth and supporting structures which will maintain themselves throughout the life of the patient. Migration of the anterior teeth, a deep overbite, malalignment of teeth, or other conditions of malocclusion are frequently features of periodontal disease which must be corrected for successful periodontal therapy. Many times such patients are given a poor prognosis, because of the malalignment of the teeth (Fig. 1). Little has been written about the treatment[4-15] of these conditions in periodontal patients. Some orthodontists have discouraged treatment in adult patients having periodontal disease, where movement of teeth is desirable. It is necessary for the general practitioner or the periodontist treating such a patient, to move the teeth into the position desired, or to extract the teeth having a poor prognosis because of their position.

Frequently, periodontal patients are anxious to have their teeth extracted because of poor esthetics. Often the home care and the restorative operations which must follow the elimination of the periodontal disease are not accomplished because of an unattractive arrangement of the teeth. By correcting anterior disfigurement, such a patient may become one who will care for his teeth most meticulously.

Prior to movement of teeth, it is best that the patients be evaluated from a systemic point of view,[16] so that no etiologic factors will be present which would make orthodontic movement result in a progression of the periodontal disturbance. A complete nutritional history should be taken, and the patient advised

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Portions of this material were presented to the Winnipeg Dental Society at Winnipeg, Canada, November 12th-15th, 1954.

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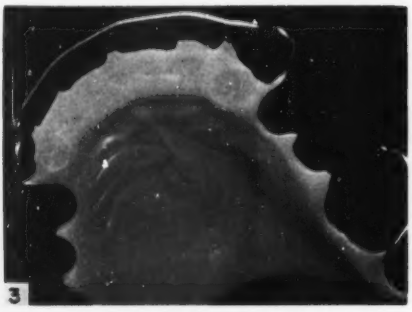
1. Mrs. R. R., Age 36—Malocclusion with severe periodontal disease.
2. Mr. R. W., Age 22—Diabetic; lateral abscess.

as to proper nutritional factors, so that the optimum conditions exist. Records should be as complete as possible, and should include pocket depths around each tooth, study models and Kodachrome photographs. These diagnostic procedures and records were completed in the case histories described below.

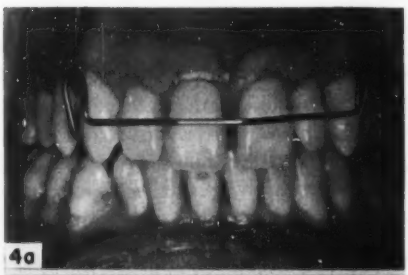
The discussion and description of these cases will be limited primarily to the problem of tooth movement, and are used to show principles of simple orthodontic procedures. To conserve space, it will be understood that all patients were periodontal patients, with periodontal pockets of varying depths, and were similarly treated to eradicate pockets. The orthodontic procedures were part of the treatment plan and not the total treatment.

CASE NO. 1

Mr. R. W., age 22, came in with a chief complaint of "gums hurt." Examination of the patient, in conjunction with the diagnostic records, revealed periodontal disease with pockets up to 6 mm, and a deep overbite (Fig. 2). There was swelling in the region of the upper central incisors and the patient could not contact the posterior teeth because the lower anterior teeth would strike the swollen area. The patient noted that the lower incisor teeth always contacted the gingival tissues lingual to the upper centrals. There was history and evidence of bruxism with a minimum of freeway space. Evaluation of systemic factors revealed diabetes. Because of the bone loss, the systemic condition, the lack of freeway space, and financial problems which would preclude complete splinting of the upper and lower anterior segments, a poor prognosis was expected.



3. Acrylic and stainless steel bite plane for Case No. 1.



4A Mr. R. W.—9 Months post-operative. Showing bite plane in position.
4B Mr. R. W.—9 Months post-operative.

5. Miss M. C., Age 29—Pockets 7 mm and "drifting" in anterior teeth.
6. Miss M. C., 1 Year post-operative showing "working" bite plane in contact with lower incisor teeth.
7. Miss M. C., 1 year post-operative, before prophylaxis, without bite plane.

An acrylic device, similar to a Hawley bite plane (Fig. 3) was constructed, using stainless steel wire. The flat bite plane[17] in the anterior region contacted the lower anterior teeth. The periodontal pockets were eliminated through reattachment operations, and/or gingivectomies[18-19] and the bite plane placed over the pack. The bite plane was worn 24 hours a day. Examination nine months later revealed normal periodontal tissues and decreased overbite without traumatic interference. Equilibration will be done and the patient instructed to wear the appliance at night only.

This case illustrates how the *deep overbite* which may affect the successful treatment of periodontal disease may be eliminated by a combination of tooth movements consisting of intrusion of lower anterior teeth and extrusion of upper posterior teeth.

CASE NO. 2

Miss M. C., age 29, came in with a chief complaint of "drifting" and movement of the upper anterior teeth with "spaces developing" (Fig. 5). Examination, including the usual diagnostic records, revealed a nutritional inadequacy, a mild hypocalcemia, and pockets up to 7 mm. A very deep overbite was also noted. The patient was referred to her physician for systemic therapy.

A device was constructed for this patient with a labial arch wire contacting the six upper anterior teeth with a bite plane similar to the device used in case No. 1 (Fig. 3). Periodontal treatments consisted of reattachment operations and/or gingivectomy, with the appliance in position 24 hours a day. Following healing, the upper anterior teeth were moved lingually. The procedure followed consisted in removing ¼ mm. to 1 mm. of acrylic from the bite plane where it contacted the lingual of the tooth to be moved. The labial wire was recontoured by straightening it over the tooth to be moved. Usually three or four teeth were moved simultaneously. The amount of pressure used upon the tooth was small, and was tested by sliding dental floss between the wire and the tooth.

One year later (Figs. 6 & 7) a comparison of the various diagnostic aids, (photographs, models and original charts) revealed a decrease in the overbite, a much better esthetic result while post-operative roentgenograms revealed a reversal of the destructive process. This young woman, who was a potential denture patient, now became a much better periodontal risk.

This case illustrates how upper anterior teeth can be moved lingually to place them in a more desirable position over the basal bone, so that stresses upon them will result in the least amount of trauma to the supporting mechanism, with resultant decrease in food impaction areas and an improved esthetic appearance.

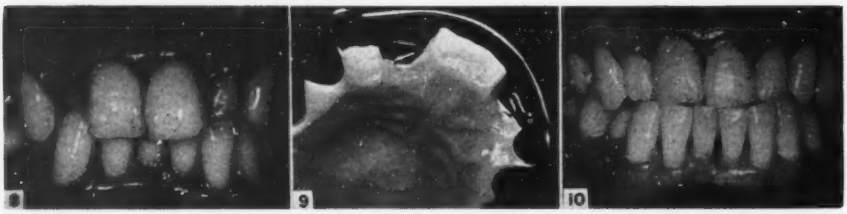
CASE NO. 3

Mrs. R. R., age 36, came in with a chief complaint "was told to have full upper and lower dentures"—"wanted to save teeth and see if anything could be done" (Fig. 1).

Diagnostic studies revealed, among other findings, that the upper left central incisor was labial to its normal position, with elongation of several teeth, and linguoversion of several upper anterior teeth (Fig. 8). There were many 7 and 8 mm. pockets. It was felt that the prognosis of the anterior segment of the arch was poor because of the lack of hygiene, because of the food impaction, and because of the trauma associated with the malalignment of the teeth.

An acrylic device was constructed (Fig. 9) with a small bite plane, to depress several of the lower anterior teeth, and elongate several upper posterior teeth. The bite plane also maintained the jaws in an open relationship so that movement would be facilitated; lingual wires were added to move the upper teeth which were in linguoversion; a labial wire was added to stabilize the appliance and to move the upper left central incisor to a more lingual position.

Post-operative examination one year later (Fig. 10) revealed teeth in a more normal arrangement;



8. Mrs. R. R., Age 36—Pockets to 8 mm.
9. Acrylic device designed to move teeth labially, or lingually, and depress or elongate others.
10. Mrs. R. R.—1 year post-operative.

a reversal of the destructive process with new bone growth in many areas; normal gingiva and a happy contented patient who was willing to spend a great deal of time caring for her mouth. This case illustrates how teeth may be moved labially or buccally into a more favorable position, while moving others lingually, and intruding or extruding others. Posterior teeth can be moved buccally by using similar appliances.

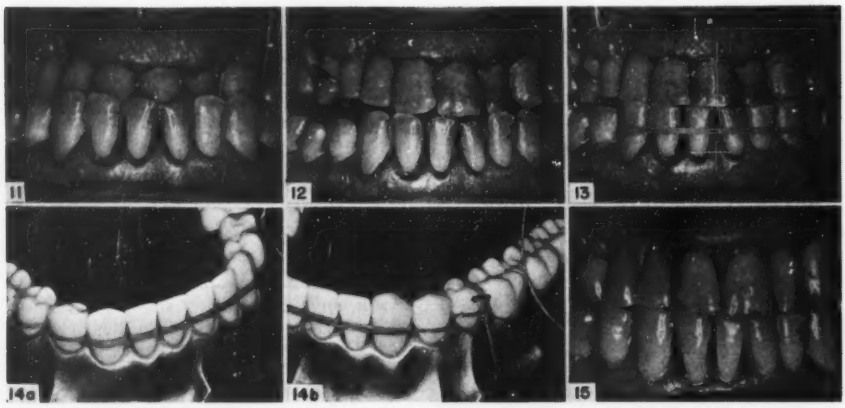
CASE NO. 4

Mr. H. H., age 41, appeared for consultation at the insistence of his wife, who desired that he retain his teeth. He had been advised to have all of them removed because of the poor esthetics and periodontal disease (Fig. 11).

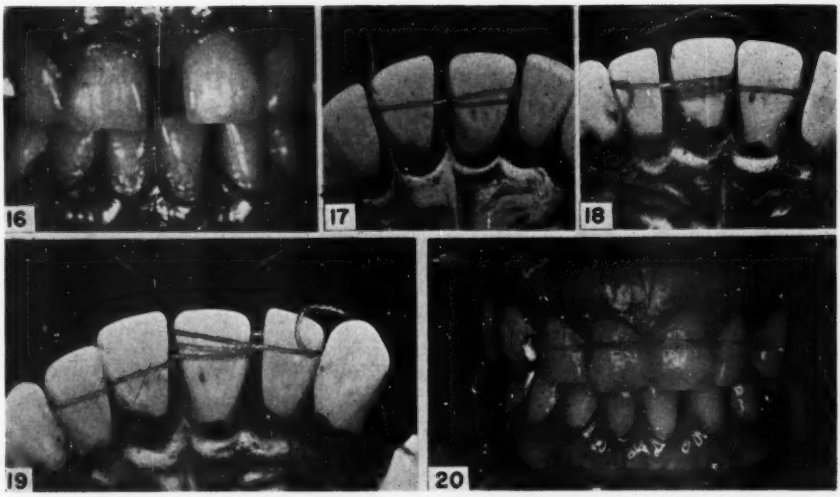
There had been a progressive separation of the lower anterior teeth with a marked crossbite, with a history of lateral abscesses in many areas. Pockets varied to 6 millimeters.

Studies of his occlusal habits revealed that the position of his teeth in closure was anterior to his most retruded position. In closing, the lingual surfaces of the lower anterior teeth first contacted the labial surfaces of the upper anterior teeth (Fig. 12). Then the patient moved his mandible forward and upward, so that his posterior teeth would occlude. There was severe mobility in the lower anterior and upper anterior teeth. The patient occasionally had pain in the region of the temporomandibular joint.

After the diagnostic visits, the anterior teeth were ground in a very few minutes, so that an end to end bite resulted (Fig. 13). Following this, the lower anterior teeth were splinted using grassline ligature (Fig. 13). Eradication of the periodontal pockets, utilizing the reattachment operation, and/or gin-



11. Mr. H. H., Age 41—Marked crossbite—Pockets 6 mm.
12. Mr. H. H.—showing point of initial contact in closure.
13. Mr. H. H.—After 1st equilibration of occlusion—showing grassline ligature in position.
14A Showing method of tying grassline ligature to bicuspids on right side.
14B Showing continuation of grassline ligature on left side.
15. Mr. H. H. Post-operative results—2 years later.



16. Mrs. M. S., age 45. Pockets 9 mm in anteriors with lateral abscess upper right cuspid.
17. Showing method of ligating central incisors for mesial movement.
18. Showing use of grassline in Case No. 5 to move lateral incisor mesially to contact.
19. Continuation of Case No. 5, showing method of stabilizing teeth which have shifted and moving opposite lateral to contact.
20. Mrs. M. S. Post-operative result—showing use of stainless steel wire as anchor and grassline ligature as moving force.

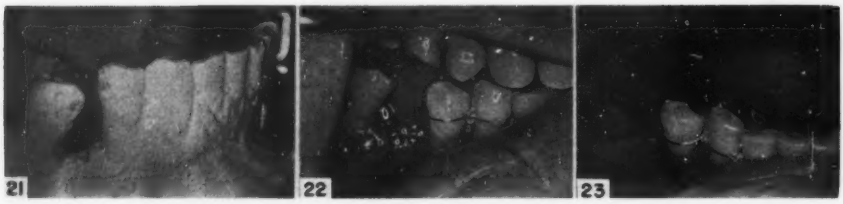
givectomy, were done. Upon return of the tissues to normal tone, grassline ligatures were applied tying together the two bicuspids on one side to act as an anchor, and passing the grassline ligature over the labial surfaces of the lower anterior teeth tying the ligature to the opposite first and second bicuspids (Fig. 14, A&B). Steel wire can be used to anchor the posterior teeth on each side, and the grassline used in shorter lengths. The object of this treatment was to close anterior spaces and create a more favorable incisor relationship. The lower teeth were ligated this way until most of the anterior teeth were in contact. The grassline ligature was changed each week. Following this, restorative procedures were instituted at his referring dentist (Fig. 15).

This case illustrates (1) how upper or lower anterior teeth can be moved lingually with the use of grassline ligature, (2) the importance of occlusal studies, and (3) how prognathism, which is a result of a convenience relationship, can be corrected.

CASE NO. 5

Mrs. M. S., age 45, presented with a chief complaint of "bleeding gums and space in front," and was advised to have "jackets" made (Fig. 16). The diagnostic studies taken revealed pocket depths to 9 mm. and a lateral abscess on the upper right side, with a history of many others. The pockets were climinated as in the previous cases.

Following removal of the pack the two upper central incisors were brought together by the use of grassline ligature, first tying one central incisor with the knot on the distal, this loop to act as a stabilizing influence for the grassline. The ligature was then passed over the two central incisors, tying the two teeth together (Fig. 17). This was changed weekly until the central incisors were in contact, which occurred in about five weeks. Spaces occurred between the central and lateral incisors when the two centrals approximated each other. These spaces were closed by ligating the two centrals together with grassline to act as an anchor. A loop of grassline was formed extending around one central incisor and to one lateral incisor (Fig. 18). This was changed at weekly intervals until the lateral incisor contacted the central. Following this, the two centrals and the lateral incisor now in contact were ligated together to act as an anchor and a loop of grassline was placed from central incisor to remaining malposed lateral incisor (Fig. 19). This was changed at weekly intervals until the four incisors came into contact. The teeth were retained in position by the use of stainless steel ligature wire (.011). Stainless steel wire can be used to ligate or splint the teeth just moved instead of grassline ligature. A short length of grassline would then be used



21. Mr. M. S.—Age 46—Model showing lower right second bicuspid position.
22. Mr. M. S.—Showing post-operative position of lower right second bicuspid.
23. "Orthodontic Device" in position moving second bicuspid distally.

to move the malposed tooth with the ligated teeth acting as an anchor (Fig. 20).

This case illustrates how anterior teeth can be moved mesially or distally in the upper or lower arch.

CASE NO. 6

Mr. M. S., age 46, presented with a chief complaint of "loose teeth." There was extensive recession throughout, with shallow pockets. Following the complete diagnostic procedures, it was felt that the successful prognosis of this case depended upon adequate splinting and restorative procedures, because of extensive loss of bone from important abutment teeth. The patient was informed of this prior to periodontal therapy. Periodontal treatment was completed as previously described.

Following the periodontal treatment, it was felt that the lower right second bicuspid was inadequate and impossible to utilize (Fig. 21) due to the inclination of this tooth, and the distal migration of the root. Fixed restorations were decided as the procedure of choice rather than removable. It was decided to retain the bicuspid in spite of the poor prognosis. A simple device was utilized and the 2nd bicuspid moved distally and more nearly vertical (Fig. 22).

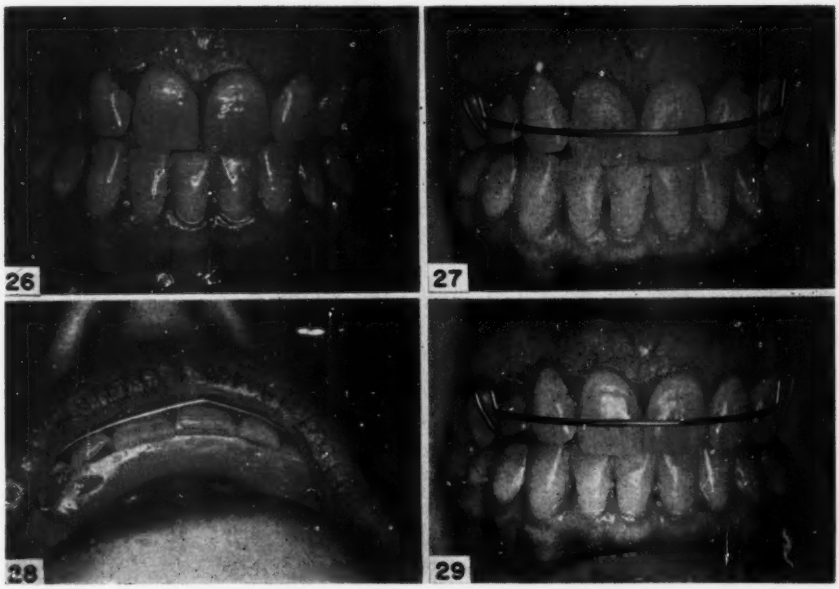
The lower right cuspid and first bicuspid and lateral incisor were ligated with stainless steel wire to act as an anchor. A piece of rubber tubing (⅛" outside diameter, 3/16" inside diameter) was sterilized, cut to proper length, and inserted between the two bicuspids with the contact area of the bicuspids in the hole of the tubing. The patient was given a variety of sizes to carry and to insert if one were lost. He was observed every three or four days. At the end of four weeks, the tubing, being used as an orthodontic force, had moved the bicuspid distally to the first molar position (Figs. 22 & 23) so that now a fixed splint was possible.

This case illustrates how, by utilizing a simple mechanism, posterior teeth may be moved distally and separated to facilitate splinting, and alter the prognosis more favorably.

CASE NO. 7

Mr. M. P., age 22, came in with a chief complaint of "pyorrhea and abscesses" in the upper left first and second molar region. Pockets varied to 6 mm. In this case (Fig. 24) the upper left second molar was completely buccal to the lower second molar, and slightly elongated. The prognosis was poor unless this molar could be moved to a more lingual position, so its relationship would be normal with respect to the lower molar, and proper contact established between the upper and lower first and second molars, to prevent food impaction.

24. Mr. M. P., age 22—Pockets 6 mm upper left molar region. Note position of second molar.
25. Mr. M. P., 2 years Post-operative.



26. Mrs. S. W., age 42—Pockets to 9 mm.
27. Showing intrusion of left central incisor.
28. Labial wire recontoured to permit elongation.
29. Finished post-operative result.

An upper removable device, similar to that described in Case No. 1, constructed of acrylic and stainless steel, was inserted (Fig. 3). The buccal arm of the molar clasp on the appliance was used to move the second molar lingually, by removing acrylic where it contacted the second molar and recontouring the buccal clasp arm. When the tooth was moved into a more normal position, equilibration was done (Fig. 25). The retainer was not needed following equilibration of occlusion.

This case illustrates how posterior teeth can be moved lingually by the use of clasp arms.

CASE NO. 8

Mrs. S. W., age 42, came in with a chief complaint of "pyorrhea" (Fig. 26). Pocket depths varied to 9 mm. An acrylic device with bite plane and labial wire, similar to the previous cases was constructed, the periodontal treatment completed, and the teeth aligned into a more favorable position.

At one of the visits for toothbrush instruction, the patient felt that the retainer was loose, and requested that it be tightened. This was done.

The following week, she complained of pain in the upper left central incisor. It was felt that this tooth was being traumatized through some habit, and the wire was tightened in this region by straightening the curve in the labial wire. The following week, there was still slight pain in the upper left central incisor, and it was noted that the right central incisor appeared longer than the left. It was ground slightly so that the length would be equal, and the wire over the left central incisor was flattened again to stabilize the tooth, as the patient complained of some slight tenderness upon that tooth.

Two weeks later, the patient returned, and it was noted that the upper left central was shorter than all the other upper anterior teeth (Fig. 27). At first this could not be understood. In recapitulating the events of the previous few weeks, it was suddenly realized that the adjustment of the wire did not stabilize the tooth. Instead, the wire forcing the tooth against the inclined plane of the acrylic device, created a resultant force which intruded the tooth. When this was understood, the labial wire was recontoured (Fig. 28) so that the left central incisor was free of pressure. Two weeks later (Fig. 29) the tooth had returned to normal length and the tenderness disappeared.

This case illustrates a technique by which teeth may be intruded where necessary. Although this was done accidentally and unintentionally, it is felt that this technique may be of some value and is being used in other cases with success.

DISCUSSION

The above procedures are not intended to displace the standard orthodontic procedures of banding and ligating teeth. Instead, they serve as emergency measures, which aid the immediate situation with respect to periodontal treatment. Other methods of moving teeth have been previously described. Wherever possible, it is wise to seek consultation with an orthodontist.

The age of the patient apparently is not a factor in orthodontic movement. In considering basic bone physiology[20] it seems that simple orthodontic procedures for a periodontal patient can be carried out with success at any age. In the cases illustrated above, as well as many more treated, there seems to be very little, if any, clinical difference in the rate of movement at different ages. However, caution should be exercised that teeth are not moved in the presence of inflammatory conditions of the gingiva, since it is possible that excessive bone destruction might ensue as a result of additional resorptive forces being placed upon the alveolar bone.

In all the cases described the teeth were retained in final position for a period of time. This retention is obtained by several methods—grassline or wire ligatures as used in temporary splints; cast fixed or removable splints; the acrylic appliance used to move the tooth, or occasionally by the occlusal relationships of opposing teeth. It is important that retention should be utilized as much and as long as possible.

It is impossible in a short paper to show how each tooth in the arch can be moved in each of the possible directions. The above cases, however, illustrate how readily upper or lower anterior or posterior teeth can be moved mesially, distally, lingually, labially or buccally, and intruded. Each case requires a knowledge of the simple basic techniques and of the physiology of the tissues concerned. Familiarity with the various materials available is important so that movements of teeth, different than given above, can be accomplished.

It appears that movement of teeth benefits the periodontal condition. The most severe cases seem to respond better to treatment when movement is required than when no movement is necessary. This may be due to the patient's reaction to the benefits derived from a more harmonious mechanical and physiological arrangement.

Pocket depths and mobility do not seem to influence the results, tooth movement having been accomplished on teeth presenting severe mobility and deep pockets. The combination of the stabilizing influences of the splinting procedures, and the stimulating influence of the orthodontic forces may be desirable.

SUMMARY

Cases are illustrated which present the basic principles of simple orthodontic movement for the periodontal patient. It is felt that orthodontic movement may be of value for the periodontal patient, if it will accomplish one or more of the following:

1. A more harmonious relationship between the adjacent teeth in each jaw, and between the teeth in opposing jaws;

2. Facilitate restorative procedures;

3. Increase the value of the teeth to the patient by improving their appearance and thus encourage the patient to devote the time and effort required to maintain them in health.

The procedures given are simple, using available materials, and can be carried out by the general practitioner.

202 So. Hamilton Drive

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SOUTHERN ACADEMY OF PERIODONTOLOGY MEETS APRIL 28, 29, MAY 1

The Southern Academy of Periodontology will hold its annual meeting at the Soreno Hotel in St. Petersburg, Florida, on April 28, 29, and May 1st, 1956. The program will feature Doctors Frank Beube, and Sigurd Ramfjord.

Officers for this year are Dr. Ernest L. Banks, president, Dr. Richard Chace, president-elect and Dr. Wallace Mayo, secretary-treasurer.

The Effect of Estrogenic Hormone on the Periodontium of White Mice[1]

by GERALD SHKLAR, B.SC., D.D.S., M.S.,* AND IRVING GLICKMAN, B.S., D.M.D.,**
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WITH the exception of two recent reports,[1,2] studies of the effect of systemically administered estrogen upon the skeletal system of experimental animals have been confined to observations in the long bones.[3-16] In the former studies the following changes in the alveolar bone of mice were attributed to subcutaneous injections with alpha estradiol benzoate: osteosclerosis resulting from endosteal bone formation, reduction in the size of the medullary spaces, the formation of a different type of bone characterized by fewer osteocytes, more intercellular substance, fewer fibrils and comparatively more cementing substance than that of normal alveolar bone. In contrast to these endosteal changes, the pattern of bone activity adjacent to the periodontal membrane was described as unaffected by estrogen. The most marked endosteal changes occurred in young mice (up to 40 days of age). In older animals (one year) there were no changes in the alveolar bone which could be attributed to the estrogen.

We were particularly interested in the effect of the systemic administration of estrogen upon the alveolar bone because of our earlier finding[17] that, when administered with cortisone, estrogen appeared to stimulate bone formation which compensated for the osteoporosis of alveolar bone induced when the former drug was administered alone. This osteogenic effect of estrogen when administered with cortisone was evidenced in the alveolar bone in relation to the periodontal membrane as well as in the endosteal areas.

Experimental Procedure: Eighty young adult white mice, RAP† strain, weighing 18-24 gm. (approximately 6 weeks old) were used as experimental animals. The animals were divided into four groups, each of which consisted of ten males and ten females. The animals in groups I and II received a weekly subcutaneous injection of 600 rat units of estradiol benzoate (Progynon B, Schering). The animals in groups III and IV were used as controls, one half receiving a weekly subcutaneous injection of sesame oil, and the remainder being uninjected. The animals in group I were sacrificed with ether at the end of five weeks together with an equal number of controls, litter mate animals being used when possible. The animals in group II were sacrificed at the end of ten weeks, together with an equal number of controls. The mandible, vertebrae, femur, and the internal organs were removed at autopsy and prepared for histologic study.

Gross Observations: No differences were observed between the estrogen injected and control animals with respect to size, weight, appearance of fur, size of the jaws, or eruption of the teeth.

Microscopic Observations: In the young adult mice (approximately six weeks) used in our studies, the first and second molars were erupted so that they occluded with their antagonists. In an effort to minimize the variable in the degree of bone formation and bone resorption activity which exists in the alveolar bone in relation to teeth in different stages of eruption, comparison of the findings was made in similar locations on comparable surfaces of corre-

[1]From the Ziskin Memorial Research Laboratory, Department of Oral Pathology and Periodontology, Tufts College Dental School, Boston, Mass. We wish to thank the Schering Corporation for supplying us with the Progynon B used in these studies.

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Fig. 1. Control Animal (5 week experimental period). Mesio-distal survey section through the mandibular first molar area. (H.E. X80)

Fig. 2. Control Animal. Detailed section of Fig. 1 showing the interradicular bone of the first molar. Three zones can be noted. In mesial portion (left) note the spherical, irregularly arranged osteocytes, and the irregularly indented margin in relation to the periodontal membrane. In the distal portion (right) note the coarsely fibrillar structure of the matrix, and the osteocytes arranged in conformity with the incremental lines. In the central portion, note the concentric lamellations around the marrow spaces and the relative sparseness of the cells as compared with the mesial and distal portions. (H.E. X220)

sponding teeth in control and experimental animals.

FIVE WEEK EXPERIMENTAL PERIOD

Alveolar Bone-Interradicular Septum

Control Animals: In the control animals the interradicular bone could be divided into a mesial portion, a distal portion, and a central portion (Figs. 1 and 2). In the mesial portion, the matrix of the bone presented a homogeneous, finely granular appearance. The osteocytes were spherical, irregularly arranged, and the bone margin in relation to the periodontal membrane was irregularly indented. The distal portion was lamellated, the matrix presented a coarsely fibrillar structure, and the osteocytes were regularly arranged in conformity with the incremental lines. In the central portion of the interradicular bone there were concentric lamellations immediately surrounding the marrow spaces and the cells were arranged in a ringlike alignment in conformity with the lamellations. External to the regular periendosteal lamellations the bone in the central portion was marked by irregularly arranged appositional and resorption lines. The matrix was relatively coarse and the cells relatively few as compared with the remainder of the interradicular septum. The bone margins lining the marrow spaces presented a varied distribution of osteoid formation, inactivity, and resorption.

Estrogen Injected Animals: The only notable difference in the interradicular bone in the estrogen injected animals occurred in the central portion, and the estrogen injected animals varied considerably in the degree to which they differed

Fig. 3. Estrogen injected animal (5 week experimental period). Mesio-distal survey section through the mandibular first molar area. Note that the central portion of the septum occupies a disproportionately large area as compared with the control animals. (See Fig. 1). (H.E. X80)

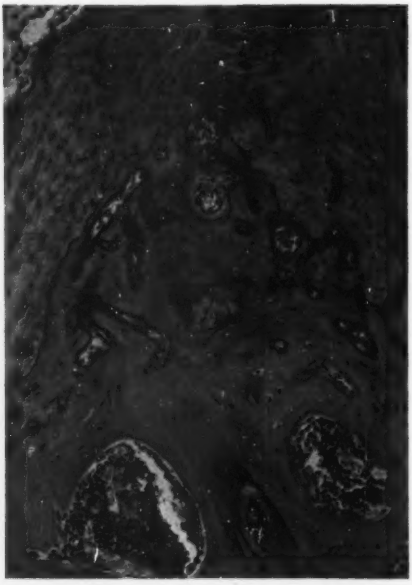

Fig. 4. Estrogen injected animal. Detailed section of Fig. 3 showing the interradicular bony septum. Note the sparse distribution of cells in the central portion and the clear demarcation of this bone from the mesial (left) and distal (right) portions. The absence of incremental or reversal lines in the central portion results in an appearance of uninterrupted homogeneity. (H.E. X220)

from the control animals in this respect. In the estrogen injected animals the central portion of the interradicular septum occupied a disproportionately large area as compared to the control animals (Figs. 3 and 4). The major portion of the central zone was occupied by a sparsely cellular bone which was clearly demarcated from the remainder of the septum by prominent, deeply staining lamellar markings. The bone immediately surrounding the marrow spaces presented some suggestion of a circumferential arrangement, but this was only in the slightest degree comparable to the controls. In the remainder of the central portion, the bone matrix was coarsely fibrillar and the cells were reduced in number.

The disparity between the cellularity of the three zones of the interradicular bone was more noticeable in the estrogen injected animals than in the controls. The cells in the central zone varied from polyhedral to spherical in shape and were for the most part larger and less uniform in appearance than those of the remainder of the septum. Although the central portion of the septum was clearly demarcated from the remainder of the bone by lamellar markings, the central portion itself was peculiarly devoid of incremental or reversal lines. This gave the bone an appearance of uninterrupted homogeneity. The endosteal surfaces of the bone in relation to the marrow spaces were similar to the controls and presented a varied pattern of resorption and formation. The overall impression was that of a reduction in the size of the marrow spaces, but a definitive finding in this regard would require quantitative measurements not included in the experimental procedure.

The estrogen injected animals varied con-

Fig. 5. Estrogen injected animal (5 week experimental period). Detailed section of the first molar interradicular bony septum showing occasional irregularly distributed resorption and appositional lines in the central portion. (H.E. X220)

siderably in the degree to which the central portion of the interradicular septum differed from the control animals. Variations were seen in litter mates of the same experimental group. In the comparatively less affected estrogen injected animals (Fig. 5) the bone in the central portion of the interradicular septa appeared somewhat more mature, and approached, but did not attain the morphologic features seen in the controls. There were lamellar markings and occasional irregularly distributed resorption and appositional lines.

Alveolar Bone-Interdental Septum

Control Animals: The distal surface of the interdental septum between the first and second molars presented a smooth regular outline with a bordering layer of osteoblasts and zones of pale staining osteoid. The mesial surface was irregularly indented with occasional osteoclasts in lacunar spaces.

Estrogen Injected Animals: The interdental septum presented no appreciable differences from the control.

Periodontal Membrane

Control Animals: The periodontal membrane consisted of dense well formed bundles of collagen and numerous fibroblasts. The collagen fibers were embedded in the alveolar bone and cementum (Figs. 6 & 7).

Estrogen Injected Animals: There was an impression of increased cellularity in the periodontal membrane. The fibroblasts appeared larger and somewhat more spherical with more prominent nuclei (Fig. 8). Whereas in the control animals mitotic figures were difficult to locate, occasional mitoses were a notable finding in the periodontal membrane of the five week estrogen injected animals.

TEN WEEK EXPERIMENTAL PERIOD

Alveolar Bone-Interradicular Septum

Control Animals: The appearance of the interradicular septum in the ten week control animals was similar to that at the five week interval.

Estrogen Injected Animals: At the end of the ten week experimental period the features of the interradicular septa of the estrogen animals were comparable to those observed at the five week interval except for the finding of an irregularly indented bone margin, devoid of new bone formation along the distal surface.

Alveolar Bone-Interdental Septum

Control Animals: The interdental septum between the first and second molars appeared comparable to that of the five week control animals except for the finding of fewer osteoblasts and less osteoid in relation to the distal surface of the septum in the ten week animals (Fig. 9).

Estrogen Injected Animals: The interdental septum differed from the controls in

Fig. 6. Control Animal (5 week experimental period). Mesio-distal survey section through the mandibular molar area showing the first molar, interdental septum and the root of the second molar. (H.E. X85)

Fig. 7. Control Animal (5 week experimental period). Detailed section of distal surface of the interdental septum, periodontal membrane and mesial surface of mesial root of the second mandibular molar (right). Note the smooth regular outline of the alveolar bone with bordering osteoblasts. (H.E. X350)

that the distal surface was devoid of new bone formation and instead presented a deeply staining, minutely indented, irregularly eroded border (Fig. 10).

Periodontal Membrane

Control Animals: The periodontal membrane consisted of densely arranged collagen fibers with numerous well formed fibroblasts. The number of fibroblasts seemed to be somewhat reduced when compared with the five week control animals (Fig. 9).

Estrogen Injected Animals: The fibroblasts were reduced in number and were irregularly distributed. The nuclear chromatin was more prominent than in the controls. The collagen fibers were reduced in amount and presented a diffuse lightly staining fibrillar appearance rather than the clear cut bundle conformation seen in the control animals (Fig. 10).

DISCUSSION

In both the five week and ten week experimental periods the effect of estradiol benzoate upon the alveolar bone was manifested in the endosteal areas and resulted in a marked difference in the appearance of the bone in the central portion of the interradicular septa. In this respect our findings corroborate those of previous investigators.[1,2] The absence of well formed concentric lamellae around the marrow spaces, the sparse cellularity, the size of the cells, the absence of reversal and appositional lines, all point to an immaturity of the bone in this area. It is a fact that in the control animals the bone in the central portion of the interradicular septa also differed from

that in the mesial and distal portions. However, one cannot avoid the impression that in the estrogen injected animals there was an accentuated and continuous formation of new bone at a rate which precluded the usual alterations in bone morphology associated with the maturing process. Although the findings indicate that estrogen stimulates endosteal bone formation, there is no evidence to suggest that it forms a unique type of bone.

The fact that the animals showed a varied susceptibility to the influence of the estrogen is what one is led to expect from experience with experimentation dealing with the effect of drugs upon laboratory animals. The variation in the response of the estrogen injected animals was expressed in terms of the degree to which the central portion of the interradicular septa in the estrogen injected animals differed from the control animals.

It is noteworthy that in the five week experimental period, estrogen did not appear to have any effect upon the periodontal surfaces of the alveolar bone, whereas in the ten week experimental period the appearance of the periodontal membrane surfaces of the interdental septa and interradicular bone was altered. This took the form of a diminished bone formative activity along the distal border of the septa and interradicular bone where bone formation is normally present.

In both the five week and ten week experimental periods, the periodontal mem-

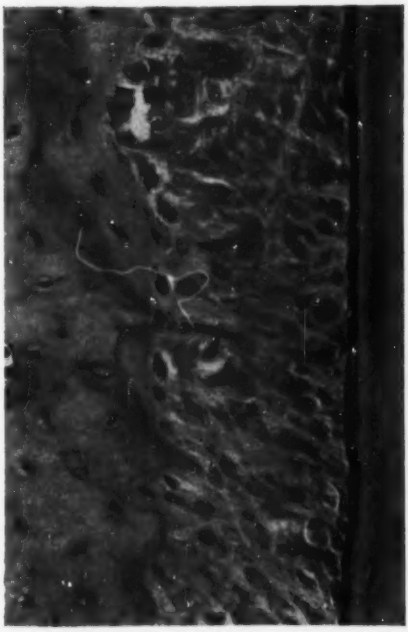

Fig. 8. Estrogen injected animal (5 week experimental period). Detailed section of distal surface of interdental septum and periodontal membrane between first and second mandibular molars in area comparable to that shown in Fig. 7. The fibroblasts of the periodontal membrane appear to be increased in number. There is a layer of osteoid lined by a bead-like layer of osteoblasts along the border of the alveolar bone. (H.E. X350)

Fig. 9. Control Animal (10 week experimental period). Detailed section of distal surface of interdental septum and periodontal membrane between first and second mandibular molars in area comparable to that shown in Fig. 7. Note the deeply staining linear border of the alveolar bone and the reduction in osteoblasts (compare with Fig. 7). The periodontal membrane presents well formed collagen and fibroblasts. (H.E. X350)

brane in the estrogen injected animals presented some difference in appearance from their respective controls. In the five week period there was a distinct impression of increased cellularity of the periodontal membrane with scattered mitotic figures. In the ten week period the estrogen appears to have had an opposite effect. The cellularity of the periodontal membrane was reduced and the arrangement of the cells was disordered. In addition, the collagen was fibrillar and the usual well formed bundle arrangement was absent. It is our interpretation that the findings in the periodontal membrane of the ten week animals results from an inhibition in the formation of new connective tissue cells and intercellular substance.

The distinct difference between the appearance of the periodontal membrane at the five week interval and at the end of the ten week experimental period indicates a marked alteration in the nature of the response to the estrogen. It may be assumed that continuation of the estrogen after the five week interval leads to an attempt on the part of the animals to accommodate to the artificially induced hormonal pattern. However it appears that this accommodation does not cease after the normal status is attained, but persists, and leads to an overcompensation.[11] Another possibility presents itself in explanation of the difference in the periodontal membrane of the estrogen injected animals at the end of the five and ten week periods. It is possible that the effect of estrogen when the animals are older (in the second five week interval) is different than during the first five weeks. In order to explore this latter hypothesis it would be necessary to initiate a series of estrogen injections in animals which are five weeks older than those used at the start of the present experiment.

Some comment is in order regarding the fact that comparable endosteal bone changes were observed in the five and ten week estrogen injected animals despite the difference in the periodontal membrane surfaces of the alveolar bone. It could be presumed that the effect of estrogen on endosteal bone formation persisted for the entire ten weeks. It also may be possible that the stimulation of endosteal bone formation which occurred during the first five weeks did diminish somewhat in the course of the second five week interval, but that sufficient time had not elapsed to permit the reorganization of bone which would be necessary to reestablish the normal morphology.

Fig. 10. Estrogen injected animal (10 week experimental period). Detailed section of distal surface of interdental septum and periodontal membrane between first and second mandibular molars in area comparable to that shown in Fig. 7. Note the reduction in number of the fibroblasts of the periodontal membrane and the irregularly indented darkly staining outline of the distal border of the alveolar septum. The collagen fibers appear reduced in amount, lightly staining, and fibrillar. (H.E. X350)

It is apparent that there are several aspects of the response of the periodontium of white mice to estrogenic hormone under the conditions of these experiments which cannot be definitely established by morphologic findings. Nevertheless one can find no possible explanation for the increased endosteal bone formation and the alterations in the periodontal membrane other

than that they are attributable to the repeated doses of estrogen.

It must be understood that when estrogen is injected in intact animals, without pre-existent hormonal imbalance, the findings actually are the result of an excess of estrogen and are not necessarily indicative of the manner in which estrogen affects the periodontium under physiologic conditions. The latter information could be derived from studies of experimentally induced estrogen deficiency followed by replacement therapy.

CONCLUSIONS

Weekly subcutaneous injections of 600 rat units of estradiol benzoate in young adult white mice for periods of five and ten weeks resulted in increased endosteal bone formation in the alveolar bone. Injections for a period of five weeks also resulted in increased cellularity of the periodontal membrane. Injections for a ten week period resulted in a reduction in cellularity of the periodontal membrane with a diminution in well formed collagen bundles and an inhibition of bone formation along the periosteal surfaces of alveolar bone.

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The editor has just been informed that Dr. Samuel B. Drellich of Astoria, Long Island, died recently. No details available.

Effect of Antiformin on Gingival Tissues

by RAYMOND E. JOHNSON** AND JENS WAERHAUG*

ANTIFORMIN was apparently introduced into dentistry by Mayrhofer (1912) as a tissue solvent in root canal surgery. According to the same author antiformin consists of 5.6 per cent sodium hypochlorite and 7.5 per cent sodium hydroxide and "has the ability to dissolve organic substances completely as sugar in water." Antiformin is brought into the market by different commercial firms and the production is seemingly not standardized as the different products have different effects (Klein).

Recently antiformin has been recommended as an excellent aid in the management of periodontal disease and according to Box "one of the chief properties of antiformin as an epithelial solvent is its thorough action in specifically searching out these tissue variations no matter how they occur." The good results of antiformin seem to have been based on clinical evidence exclusively and no histologic examination has, to the best of our knowledge, been reported.

As antiformin is strongly alkaline it was considered to be of importance to find out whether or not the application of this drug would cause any irreparable damage. At the same time the object was to decide what was the beneficial effect, if any.

MATERIAL AND METHOD

Eleven teeth in 1 healthy young monkey with little or no inflammation of the gingivae were used for the experiment. Young animals were chosen to be sure that the epithelial cuff (epithelial attachment) ended at the cemento-enamel junction. Any downgrowth of epithelium below this landmark, which is easy to determine in the histologic section, thus can be evaluated. Under nembutal anesthesia the antiformin was brought into the pockets around these teeth by means of a thin flat instrument. Effort was made to bring the medicament to the bottom of the pocket all around the tooth. During this procedure the depth of the pocket was measured to be able, during the examination of the slides, to decide whether or not the medicament had been inserted to the deepest point of the epithelial cuff. No attempts were made to curette the soft tissue wall of the pocket. The surplus of the medicament was then washed away, and the tissue was allowed to heal for periods varying from 2 hours to 11 days. The animal was then sacrificed and the jaws fixed in 10% formalin. The specimens were embedded in celloidin and the sections stained with hematoxylin-eosin.

TABLE I

Tabulation of Observation Periods in the 11 Teeth Used in this Experiment.

Tooth	*Observation Period*
LR 7	2 hours
LR 6	"
LL 7	"
LL 3	16 hours
LL 4	"
LR 4	3 days
LR 3	"
UR 3	9 days
UR 2	"
UL 3	11 days
UL 4	"

OBSERVATIONS

Clinically there was some sloughing off of the epithelium near the gingival margin and in areas where the antiformin unintentionally had come in contact with the

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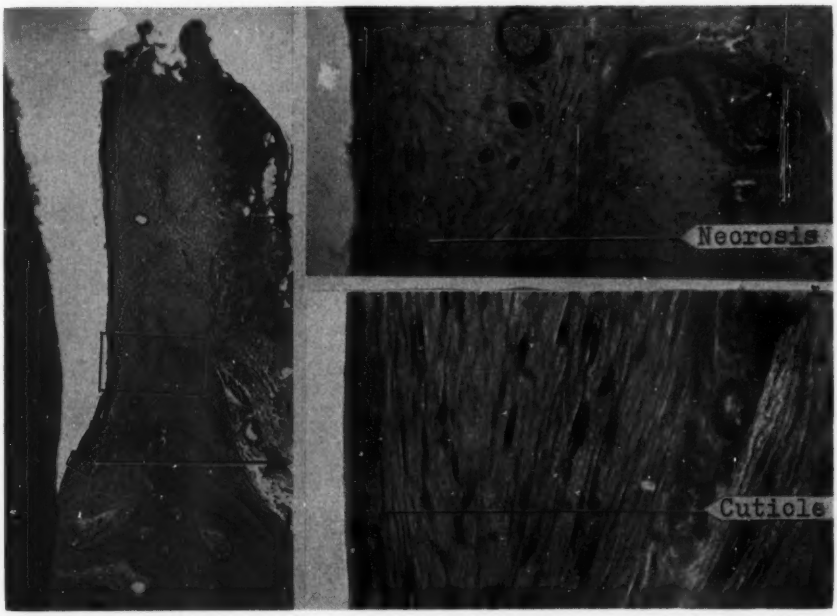

Fig. 1. LR 7. Observation period 2 hours. Antiformin to bottom of clinical pocket. All epithelium and part of connective tissue necrotized from gingival margin to cemento-enamel junction. Dilatation of vessels and perivascular emigration of polymorphonuclear leukocytes (top right). Inflammatory response slight (bottom right).

mucosa. When pressure was added to the gingivae, fluid could be pressed out of the pockets for some days after the treatment. However, the healing progressed satisfactorily.

The 5 illustrations are representative for the material. Two hours after the insertion of the antiformin a complete necrosis of the epithelium and an extensive necrosis of the connective tissue was observed (Fig. 1). Most of the necrotic tissue was removed after 16 hours (Fig. 2). After 3 days the healing was advanced and the epithelial lining of the pocket was continuous in some areas (Fig. 3, center) while in other areas it was partially missing (Fig. 3, right). However, the epithelial cells showed irregularities and some degeneration (Fig. 3, left). The inflammation in the connective tissue was inconsiderable in the deeper part. Bacterial plaque had formed below the gingival margin and adjacent to this the inflammation was more pronounced. The healing was nearly complete after 11 days (Fig. 4). The epithelial cuff had been rebuilt and had a normal appearance, and little or no difference could be seen when compared with the gingivae from control teeth. There was no downgrowth of epithelium below the cemento-enamel junction, and the inflammation was hardly more extensive than around the control teeth. In the sections cut after 2 hours, 16 hours and 3 days it could be seen that the instrument with the antiformin had reached the cemento-enamel junction (Figs. 1 and 2) or even a little below it (Fig. 3, right). In the 9 and 11 day specimens a comparison between the depth of the clinical pocket and the distance from the gingival margin to the cemento-enamel junction verified that a similar result had been obtained here as well.

On the lingual side of lower left 2nd molar where the pocket was not filled, the antiformin unintentionally had run along

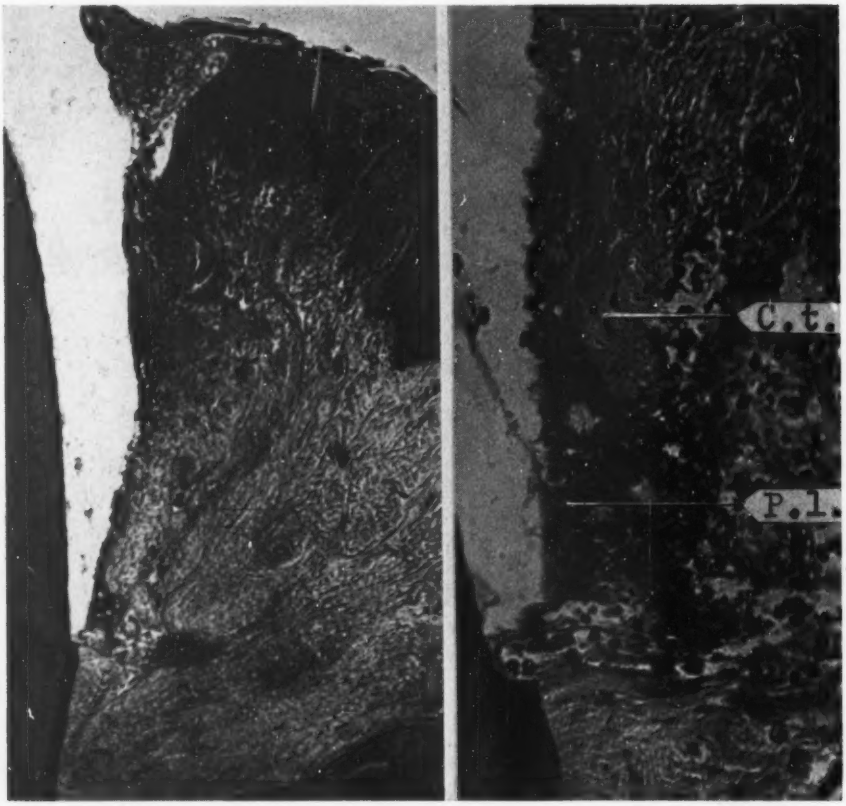

Fig. 2. Observation period 16 hours. Antiformin to bottom of clinical pocket. Epithelium completely necrotized. Necrotic tissue mostly removed. Polymorphonuclear leukocytes (P. l.) against tooth surface. C. t., connective tissue.

the gingival margin and had necrotized the outer part of the epithelium (Fig. 5). The necrosis reached some of the connective tissue papillae, but, in between, the Malpighian layer and the basal layer was not damaged.

DISCUSSION

Antiformin is obviously a powerful escharotic as not only the epithelium, but also parts of the connective tissue were necrotized after 2 hours (Fig. 1). However, the effect of the medicament seems to be limited to the tissues that were affected at the time of insertion, as the inflammation was inconsiderable in all the stages. After the insertion of antiformin, the surplus was apparently removed from the tissues by the bleeding and the increased transudation caused by the drug. The fact that the drug was not allowed to penetrate deeper into the tissues seems to explain the rapid healing. The reaction in healthy gingival pockets to antiformin is comparable to that observed after insertion of concentrated cultures of bacteria (Waerhaug & Steen). The bacteria also caused an extensive necrosis, but a complete healing was always the result. The necrotized tissues are apparently quickly liquefied and squeezed out of the pocket, as only slight traces of it were left after 16 hours (Fig. 2). Conse-

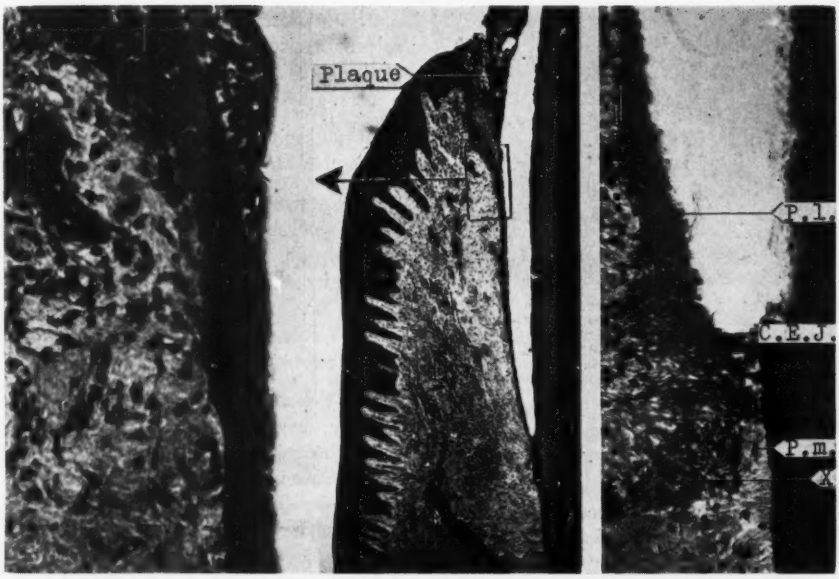

Fig. 3. LR 3. Observation period 3 days. Antiformin to bottom of clinical pocket. Epithelial lining re-built, (center), but epithelial cells show degeneration (left). Photomicrograph to the right taken from section same distance from survey picture. Epithelium as yet not regenerated in this part, and polymorphonuclear leukocytes (P. l.) border upon enamel. X, marks made by instrument at time of insertion. Periodontal membrane fibers, P. m., not necrotized near to cementum.

quently, curettement of the soft tissue wall should be unnecessary.

In the 6 cases with observation periods of 3 days and longer no downgrowth of epithelium below the gingival margin was observed. This material is too small to allow any extensive conclusions to be drawn, but it suggests that irreparable damage may not be caused by the use of antiformin. On the other hand one may ask what is the beneficial effect of this medicament in pathologic pockets, where subgingival calculus is present. It may help in the achievement of reattachment because it efficiently necrotizes the epithelial cells (Fig. 1) which is difficult to achieve by means of curettement,[4] and it may even act as an antiseptic, killing the bacteria in subgingival calculus that has not been removed. From earlier experiments[5] it is known that healing results when subgingival calculus is removed completely, so in that case no medicaments are needed. Except for these antiseptic and escharotic qualities, antiformin seems to have no specific effect and in the present series there was nothing indicating that the epithelium was more severely attacked than the connective tissue. The question is, therefore, whether a less powerful escharotic might not give the same effect. During

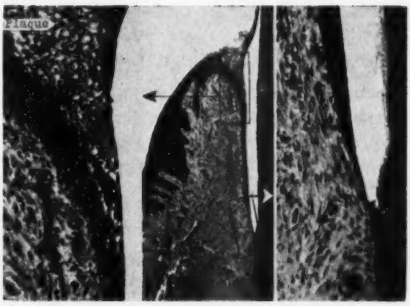

Fig. 4. UL 3. Observation period 11 days. Antiformin to cemento-enamel junction (bottom of clinical pocket). Epithelial cuff unbroken and of normal appearance. Inconsiderable inflammation in connective tissue.

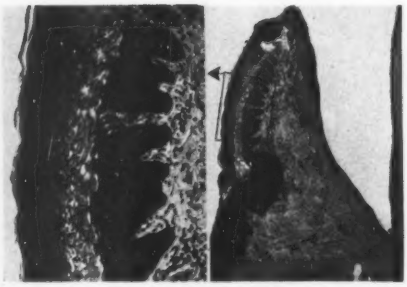

Fig. 5. LL 7. Lingual part of pocket which was not filled with antiformin. Observation period 2 hours. Medicament unintentionally run along gingival margin. Superficial epithelial layer necrotized, but basal layer mostly intact.

the application of a medicament some of it may unintentionally get in contact with the outside of the gingivae and/or the oral mucosa. In that case necrosis of part of the epithelium may ensue and this may be painful, although not irreparable (Fig 5). This illustration demonstrates also why superficial lesions of that kind so easily heal: The connective tissue is exposed only at the tips of the papillae while nearly the entire basal layer is intact. Thus, the epithelium need not proliferate all the way from the margin of the lesion.

This series confirms earlier observations that thin instruments inserted into pockets with slight pressure for clinical purposes usually will end up at the deepest point of the "epithelial attachment." For the treatment of periodontal cases the acknowledgement of this fact is of the greatest importance.

With the knowledge of the similarity in reaction of the gingival tissues in man and monkeys, one may assume that the tissue response after application of antiformin in man is basically similar to that observed in this series.

CONCLUSIONS

1. The drug, antiformin, acts as a powerful necrotizing agent, but its effect is limited.

2. Antiformin is not a specific epithelial solvent as it attacks connective tissue as well.

3. After insertion of antiformin in healthy gingival pockets healing ensues and irreparable damage should not be expected.

4. Curettement of the soft tissue wall of the pocket seems to be unnecessary as the necrotic tissues are liquefied and removed by the defense mechanism of the body.

SUMMARY

In 11 healthy gingival pockets in one monkey, antiformin was inserted. Histologic examination of the gingival tissues revealed a complete necrosis of the epithelium and part of the connective tissue after 2 hours. The necrotic tissue was mostly removed after 16 hours, and the healing was well advanced after 3 days. The healing was nearly completed after 9 to 11 days with re-adaptation of a normal epithelial cuff to the enamel. In all stages the inflammatory response was very slight and no pocket deepening was observed.

Acknowledgment. The experiments and the preparation of the histologic sections have been done in the Division of Periodontology, Dental School, University of Minnesota. For this service the authors express their sincere thanks to Dr. H. A. Zander.

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The Management of the Alveolar Bone in the Treatment of the Periodontal Pocket

by FERMÍN A. CARRANZA, D.D.S.,* AND FERMÍN A. CARRANZA, JR., D.D.S.,**
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ONE of the most controversial problems in the treatment of the periodontal pocket is that of the management of the bony margin. Until 1935 it seemed clear that the "necrotic and infected" bone, with "small sequestrae," had to be eliminated for the lesion to be able to heal. Many authors prior to 1935 advise bone removal for this reason.[2, 6, 14, 15, 21]

By the work of Kronfeld[16] and others[7, 8, 12, 22] it was demonstrated: (a) that the bone is only reached by the inflammatory infiltration caused by the infection existent in the pocket, which penetrates mainly through the course of the blood vessels, producing generally the osteoclastic resorption of the alveolar bone from the outer wall and towards the periodontal membrane, (b) that the bone is never necrotic nor infected, and that sequestrae are not produced, (c) that once the pocket is eliminated, the inflammatory infiltration which invades the bone disappears, the loss of bone stops and the bone is left in biologic condition to undergo repair.

Present knowledge of bone pathology in periodontal disease seems to indicate that the bone is not affected beyond repair and that, consequently, in pocket elimination, bone should not be exposed, much less removed. However, if the goal of the treatment is the complete elimination of the pocket, in intraalveolar pockets† the operator finds himself confronted with a choice of two possibilities: (a) to leave the bone intact and attempt to obtain reattachment, or (b) to remove bone as part of the overall elimination of the pocket.

REVIEW OF THE LITERATURE

The most representative opinions about the management of the bony margin in the treatment of periodontal pockets in general include the following:

Glickman[11] maintains that the bone which forms the outer wall of the intraalveolar pocket should not be disturbed, because once the soft wall, the epithelial attachment and the granulation tissue have been eliminated and the tooth surface properly scaled and planed, the tissues are left in a favorable condition to succeed in obtaining reattachment and the bone that has the intraalveolar trough can undergo repair. From a biological point of view, this concept is valid and logical, but it is difficult to attain a reasonable percentage of successes. The same author agrees to eliminate bone if the treatment without bone removal has failed due to causes that cannot be attributed to lack of technic.

Orban[17] who does not look for the coronary ascent of the bottom of the pocket because he doubts the possibility of reattachment of fibers to previously denuded cemental tissue, accepts the necessity of bone removal in the following cases: (a) in intraalveolar pockets of the palatal surfaces of the upper teeth, on the buccal surfaces of lowers which are according to him, the only surfaces, plus the proximal ones, where an intraalveolar pocket can appear. In these cases he does not hesitate to remove bone because the bony crest is of no use as a support for the tooth. (b) in the bifurcation of the lower molars, where it is difficult to keep the inter-radicular space clean, the bifurcation can be opened to facilitate cleaning. On the other hand, under no circumstances will he agree to remove bone in the proximal surfaces because it would affect the supporting bone of the adjacent tooth.

Ramfjord[18] accepts the removal of bone in order to obtain an adequate gingival contour.

Beube[1] says that bone removal in the treatment of the intraalveolar pocket reduces the chances of a recurrence of the pocket and assures an adequate architecture of the gingiva. He suggests that bone

Based on part of the official Report presented by the senior author to the Sao Paulo Dental Congress, October 1954.

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†Other terms used to describe this condition are infrabony pockets, intrabony pockets or subcrestal pockets.

be removed in pockets which are of shallow or moderate depth in relation to posterior teeth.

Goldman[18] agrees to the elimination of bone when the intraalveolar pocket is so wide that reinsertion is not possible or when there is an interdental trough between the buccal and lingual plates or when treatment attempting reattachment has failed.

Schluger[19] maintains that bone removal is necessary under certain conditions. He stresses the importance of levelling the alveolar crest and lists five cases where bone removal is indicated because with only a simple gingivectomy the total elimination of the pocket would be impossible and recurrence can follow.

Gilson[10] says that when the base of the pocket is apical to the alveolar crest, in order to eliminate the pocket it is necessary to remove bone.

Wannenmacher[20] advises the elimination of sharp edges of bone and the scaling and planing of the bony wall of pockets in the interdental spaces.

Froelich[9] advises what he calls "remodelling gingivo-osteotomy" for intraalveolar pockets in relation to isolated teeth.

Carranza in 1935[3] and in 1942[4] presented a detailed description of the conditions in which bone removal is indicated.

From this brief review, it can be concluded that, at least in certain cases, it is necessary to expose and remove bone

WHEN SHOULD BONE BE REMOVED?

Although we do not recommend removal of bone as a general policy, we feel there are some cases where bone removal may be indicated. They are the following:

1. In intraalveolar pockets where the removal of bone does not entail a sacrifice of useful bone for the affected or adjacent tooth. This occurs in the following cases:

(a) In intraalveolar pockets on the buccal and lingual surfaces (Fig. 1, A and B). The authors have seen intraalveolar pockets in relation to every surface of all teeth, including the labial surfaces of anterior teeth.

(b) In intraalveolar pockets on proximal surfaces when the adjacent tooth is missing (Fig. 1 C).

(c) In interdental bone craters, in which the buccal and lingual plates are higher than the level of intervening bone (Fig. 1 E). Here the elimination of the crater requires the removal of either or both of the crater walls and as much of the useful bone in relation to the adjacent tooth as is necessary to obtain a smooth bony architecture.

(d) In intraalveolar proximal pockets between two adjacent teeth when there is a bony spur remaining between them (Fig. 1 D).

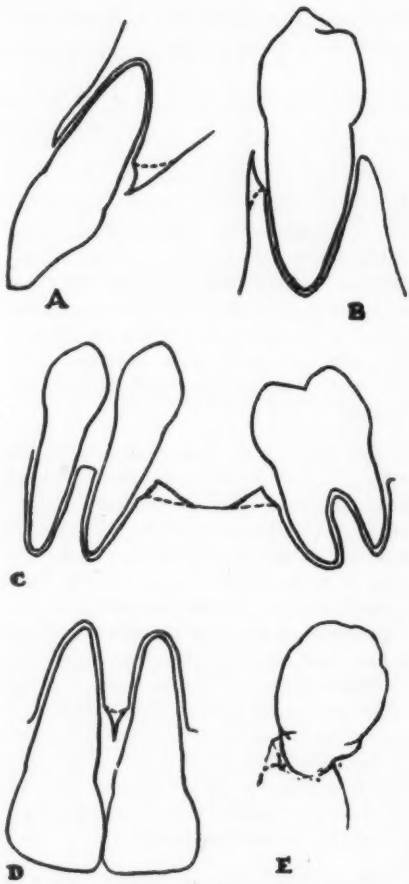

Fig. 1. Cases in which bone removal does not mean a sacrifice of useful bone. (A) and (B) in buccal and lingual surfaces. (C) in proximal surfaces when the adjacent tooth is missing. (D) an interdental bony spur. (E) in interdental bony troughs.

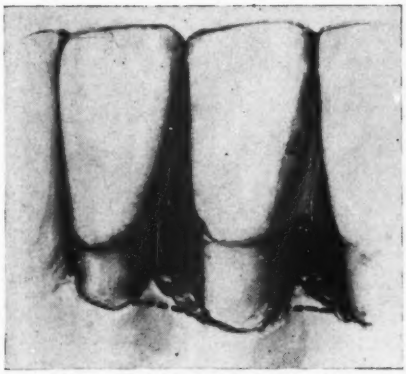

Fig. 2. Interdental intraalveolar pockets. (Case 2).

2. In intraalveolar pockets along proximal surfaces when the removal of bone is indispensable to eliminate the pocket, even when this means the removal of useful bone. In these cases, all systemic and local factors that play a part in the prognosis have to be carefully evaluated, and if the prognosis is good, the operator should not hesitate in sacrificing *small portions of bone* even though it may mean the elimination of supporting bone of the adjacent tooth. It should be done only when such a sacrifice neither affects the stability nor the strength of the adjacent tooth in such a way as to make the prognosis less favorable (Fig. 2). In these cases the advantages hoped for, must be carefully weighed against the damage that will be caused.

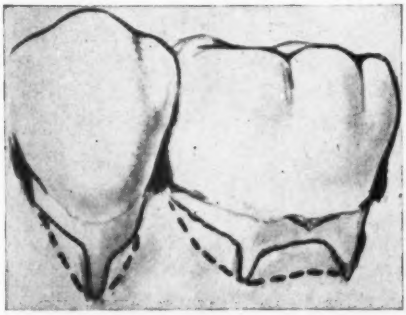

Fig. 3. Bone irregularities in buccal and lingual surfaces. (Case 3).

3. In supraalveolar pockets when there are very marked differences in the height of the crestal bone, thus greatly favoring a recurrence (Fig. 3).

4. In bifurcation or trifurcation involvements, to make a good cleaning of the space possible (Fig. 4).

WHY SHOULD BONE BE REMOVED?

Whenever bone regeneration cannot be attained, bone removal is indicated in the treatment of a periodontal pocket for one or more of the following reasons:

1. Because the lateral wall of the pocket includes bony tissue.

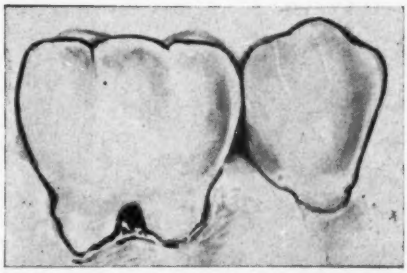

Fig. 4. Bifurcation involvement. (Case 4).

2. To prevent an almost sure recurrence.

3. To remodel the alveolar crest in order to be able to get a functional restitution of the fibers attached to it.

Points 1 and 2 are self-explanatory and need no further clarification. We shall elaborate on point 3.

One of the characteristics of intraalveolar pockets is that they include a change in the shape of the bony crest. This change of shape of the bone is associated with structural and functional changes in the cresto-dental and periostiodental fibers.

These fibers normally have an ascendant direction towards the crown forming a

Fig. 5. Photomicrograph of a supraalveolar pocket. The alveolar crest is reduced in weight but the fibers have their normal direction and function.

Fig. 6. Photomicrograph of a supraalveolar pocket. Note the cresto-dental fibers with their normal direction.

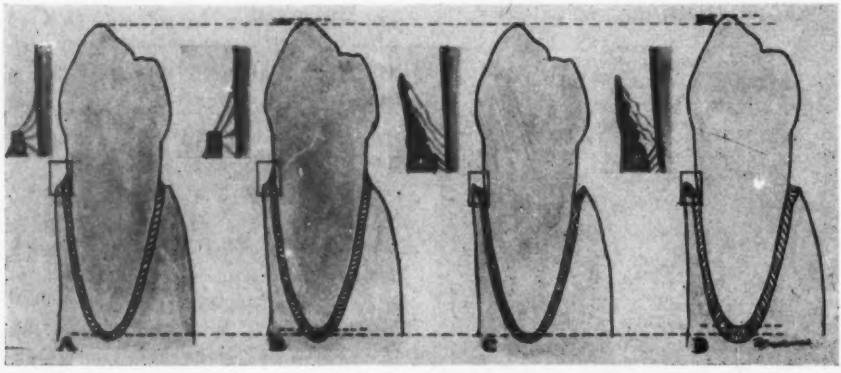

Fig. 10. Diagrammatic representation of the action of the cresto-dental and periostio-dental fibers. In normal cases (A) or in supraalveolar pockets (B) the cresto-dental fibers stop the extrusive movement. In intraalveolar pockets (C), the extrusive movement is greater because it is only stopped by the oblique fibers of the periodontal membrane (D).

Fig. 7. Supraalveolar pocket in an interdental space. Note the transeptal fibers with their normal morphology.

Fig. 8. Photomicrograph of an intraalveolar pocket. The form of the alveolar crest changes and the fibers alter their direction and lose their function.

conical fibrous diaphragm with the main function of playing an important role in keeping the tooth pressed against the bottom of the socket and preventing the excessive extrusion of the tooth. In supraalveolar pockets the descent of the crest is accompanied by a descent of the fibers which maintain their normal direction and structure as well as their normal function (Figs. 5, 6, 7). In intraalveolar pockets the shape of the bony crest changes and its relation to the tooth is modified. The cresto-dental, and transeptal fibers are replaced by long and loose fibers with a direction opposite to the normal. They extend obliquely towards the apex, so that they can no longer restrain the extrusion of the tooth (Figs. 8, 9).

This is the reason why, in intraalveolar pockets, the extrusive movement of the tooth increases; it is only stopped when the direction of the underlying oblique fibers of the periodontal membrane is reversed (Fig. 10). In its extruded position the tooth is constantly traumatized, during all the mandibular excursions, thereby accelerating the loss of bone and diminishing the likelihood of repair of the periodontal tissues.

The desired result of the treatment is the

Fig. 9. Photomicrograph of an intraalveolar pocket in an interdental space. The transeptal fibers lose their direction and function.

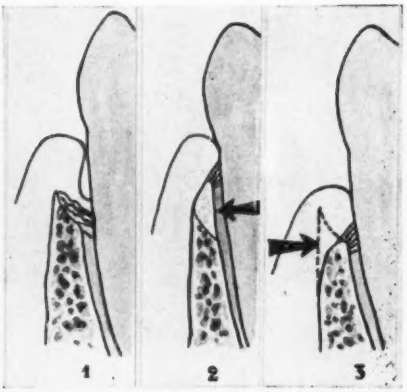

Fig. 11. Diagrammatic representation of the remodelling of the crest: 1. intraalveolar pocket; 2. bone regeneration (the arrow indicates the regenerated bone); 3. surgical osteoplasty (the arrow indicates the removed bone).

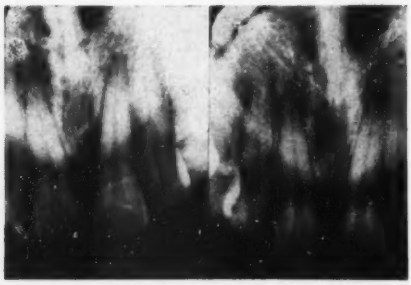

Fig. 12. Radiographic demonstration of a case of bone regeneration of the crest. Before and after.

remodelling of the alveolar crest so that the cresto-dental, periostio-dental and transeptal fibers have a chance to regenerate in their normal anatomical position and thereby recover their function. Such restoration of these fibers can only take place if the alveolar crest recovers its normal morphology. The alveolar crest may recover its morphology in two ways: (1) By completely filling the intraalveolar breach by bone regeneration, obtaining what we could call a *biologic remodelling* of the crest (Fig. 11). (2) By surgical elimination of the eroded segment of bone thus obtaining a *plastic remodelling* of the crest (Fig. 11).

In the first case—the ideal result—which may be attained with the treatments that attempt reattachment, bone is not removed and the periodontium is restored to a position coronal to the one existing when the pocket was present[5] (Fig. 12). In the latter case, performing a plastic bone surgery of the alveolar crest the fibers can regenerate and recover their normal function; but the level of their attachment

Fig. 13. Radiographic demonstration of remodelling of the crest by surgical osteoplasty. Before and after.

will be apical to that which may be attained if bone is not removed. It is the transformation of a vertical bone loss in a horizontal one[23] (Fig. 13).

In the cases where there is no possibility of reattachment or where the treatment attempting reattachment has failed surgical remodelling has to be accepted as a last resort to obtain functional recovery of the periodontium.

A very conservative attitude must always govern bone removal, bearing in mind that the goal of the treatment should be: (a) the eradication of the pocket, and (b) the reshaping of the alveolar crest, with a minimum sacrifice of bone structure.

SUMMARY AND CONCLUSIONS

1. The management of the alveolar bone in the treatment of the periodontal pocket has been analyzed based upon clinical and histological studies.

2. As a general rule, in the elimination of all types of pockets it is preferable not to disturb the alveolar bone.

3. Certain conditions are presented in which the removal of alveolar bone may be included as a part of the process of pocket elimination.

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Crown and Bridge Restorations in Periodontics

by ALLISON G. JAMES, D.D.S., *Beverly Hills, California*

TO a dentist, the term 'crown and bridge' usually connotes fixed prostheses, although certain removable types should be included; but invariably it implies tooth-supported replacements. The prime purpose of any dental bridge is to preserve the remaining teeth, and should receive the greatest consideration. The purposes of restoration of masticatory function, of phonetics, and improvement of esthetics become secondary with relative values according to the individual requirements. Since the principles governing the indications for removable prostheses have been rather completely covered previously,[1] this discussion will be limited to fixed bridge replacements.

The life of a fixed bridge may be considered as a continual contest between load and abutments. A successful bridge is one in which the balance is always in favor of the abutments. First consideration should be the abutments available—how many are there? Next, what is the character of bone in which they are supported? What vertical length do the abutments have? How much is extraosseus, how much intraosseus? In a case of horizontal atrophy in an older patient with hard supporting bone evident in the roentgenogram, the excessive apparent extraosseus length may not be a serious deterrent.

The most effective and best tolerated method of interattaching multiple abutments at the end of a bridge span has been found to be the long dowel and socket. Normally the dowel should be upon the mesial surface of the most posterior abutment, inserted into the socket on the distal of the next anterior abutment, and progressively forward in that manner. Similarly, one end—the anterior end of the fixed bridge in the posterior part of the mouth—is most effectively attached by means of a long dowel in the adjacent supporting abutment. A small right-angled or acute-angled setscrew may be inserted through the abutment casting into a depression in the male dowel if further rigidity is required. If for any reason it appears advisable to place the male dowel on the anterior of a pair of adjacent abutment teeth, then in all probability the setscrew should be employed. The use of this device allows minute but imperceptible movement of the individual abutment teeth. Experience over a number of years indicates that this method encourages periodontal health of the individual teeth, and at the same time allows more conservative cavity preparation than might otherwise be the case.

The load to which a bridge is subjected is governed by the opposing forces. Obviously, those forces which would be exerted through the medium of an opposing full denture would be markedly less than forces which would be exerted by sound, natural teeth opposing. Broad, flat occlusal surfaces greatly increase the load during the masticatory process, whereas anatomically carved occlusal surfaces properly articulated with opposing normal anatomical forms minimize the vertical pressures required in mastication, and only after complete contact of the opposing dentition is the full load exerted.

The load to which a bridge is subjected is modified by the length of span, the buccolingual diameter of the pontics, as well as that of the abutment castings, and the occlusal form, both of pontics and abutments.

Leverage exerted upon a bridge is a very important consideration. Steep cuspal inclinations, or over-anatomized carvings with opposing long cusps of either natural or artificial teeth, increase the leverage if there is any interference. In the absence of cuspal interference it would appear that the more effective shearing quality of the apparatus on the bolus of food offsets the potential increase in lateral leverage.

Fig. 1. Bridge span from second premolar to right maxillary central incisor. Maxillary first molar used as reinforcing abutment.

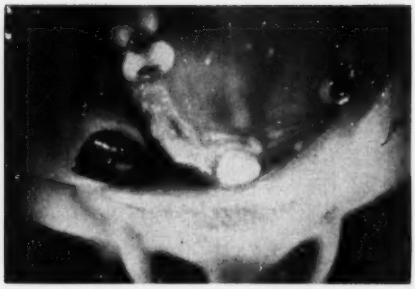

Fig. 3. Mirror view of the bridge span. Note that the deviation from a straight line between the two primary abutments is not as great as might be anticipated.

Deviation of the bridge restoration from a straight line between the two primary abutments is an important cause of leverage occasionally overlooked. Judgment will dictate the limits imposed in a given case.

Two cases are used to illustrate the principles discussed. Fig. 1 shows the span of a bridge extending from the second maxillary premolar to the right central incisor. The first maxillary molar was used as the reinforcing abutment. Fig. 2 shows the bridge prior to insertion; it will be noted that the male dowel is on the molar abutment casting, locking into the premolar, and that the anterior end of the bridge span has a dowel received in the receptacle on the central incisor abutment casting. There is a small setscrew which will be tightened and finished down after setting. Fig. 3 shows a mirror view of the bridge area. It will be noted that the deviation from a straight line between the premolar and the central is not as great as might be anticipated. Fig. 4 shows the bridge cemented to place, before removal of the rubber dam. In Fig. 5, a mirror view immediately after removal of the dam, the occlusal surfaces are shown. Because of the lingual inclination of the central incisor, it was impossible to obtain the angle showing the finished-off setscrew in the central incisor. The final picture (Fig. 6) of this case was made one week after setting, and shows the general appearance of the finished restoration. This bridge has now been in use slightly more than five years; all abutments remain firm, with healthy gingival

Fig. 4. Bridge immediately after cementation, before removal of rubber dam.

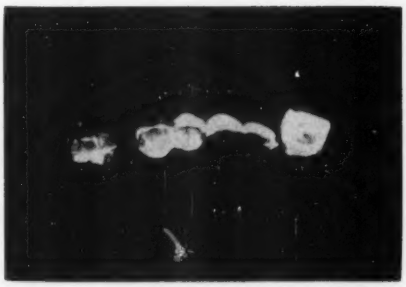

Fig. 2. Finished bridge ready for insertion. Note male dowel on the molar casting fitting into the receptacle on the distal of the second premolar abutment. The anterior end of the bridge span has a similar dowel fitting into a receptacle in the central incisor which has a small setscrew which will be tightened and finished down after setting.

Fig. 5. Mirror view immediately after removal of the rubber dam. The lingual inclination of the central incisor precludes obtaining a photographic angle showing the finished-down set-screw in the central incisor.

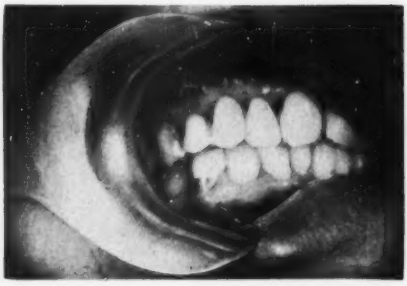

Fig. 6. Picture made one week after setting of the bridge. After more than five years' use, periodontal health is maintained and all abutments remain firm.

tissues, and there is no mobility whatsoever in any of the abutment teeth.

Fig. 7 shows a maxillary anterior bridge supplying the four incisor teeth. In this instance three abutments were used at each end of the bridge. Fig. 8 is a mirror view of the bridge span itself being tested in the mouth. The excessive deviation of the bridge from a straight line between the two most anterior abutments should be noted. This necessitated the use of two auxiliary distal abutments on each side; the receptacle on the distal of each canine abutment shows for the reception of the dowel from the premolar. Fig. 9 shows the bridge with all abutments in position. This restoration has now been in use a full five years. There is no evidence of periodontic destruction about any of the abutment teeth and they all remain firm and healthy.

Pontic shape is of particular significance in fixed bridge work. It is the writer's belief that when first placed, no pontic should be in actual contact with the soft tissue of the alveolar ridge. The *surfaces* approximating the bridge should be convex in all directions, although this does not preclude a concave *line* in profile. Many years ago it was noted that whenever a Tinker-type pontic bridge was removed for any reason, the tissue immediately against the pontic had an angry, inflamed appearance. Furthermore, it was observed that such a bridge two days later could not be carried fully to place unless the porcelain root tip

Fig. 7. Maxillary anterior bridge supplying four incisors. Three abutments were used at each end.

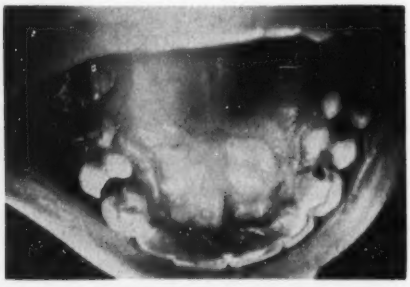

Fig. 8. Mirror view of the bridge span itself being tested in the mouth. The excessive deviation of the bridge from a straight line between the two anterior abutments should be noted. Note the receptacles for the long dowels on the distal of each canine.

Fig. 9. The entire bridge assembly in place, the most distal abutment, the second premolar, locking with a dowel into the first premolar, which in turn has locked into the canine by the same type of dowel. This restoration has now been in use more than five years, with no evidence of periodontic destruction about any of the abutment teeth.

were ground considerably shorter. The generally accepted practice then was to scrape the cast before constructing a porcelain root tip on a pontic so that when the bridge was carried to place it caused blanching of the tissues.

In 1935 the writer began experimenting with pontics of this type by placing different thicknesses of tin foil over the unscraped cast before building the porcelain root tip. Bridges made with varying degrees of clearance were set with temporary cement and periodically removed for examination. The conclusion reached was that even with rather severe clearance of the tissue by the pontic, the tissue would ultimately reach to make apparent contact, but without the inflammatory area showing upon removal. With the advent of acrylic resins to substitute for the porcelain it was found necessary to give even greater clearance.

Adequate embrasures between pontics and abutments, as well as between adjacent pontics, are very important. Correctly shaped they allow flushing action, and do not retain food particles. This is particularly true of posterior replacements. Patients must be taught adequate brush massage as well as finger massage technics to maintain the health of the soft tissues, whenever fixed bridges are inserted.

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WESTERN SOCIETY OF PERIODONTOLOGY MEETS MARCH 16, 17, 18, 1956

The Western Society of Periodontology will hold its annual meeting in Las Vegas on March 16, 17, 18, 1956, with Dr. Henry Goldman as the principal speaker. The officers of this society are Dr. Robert Reeves, President, Dr. Henry Barnhart, Vice-president, Dr. Sylvan Schireson, Secretary, Dr. Joseph Nolan, Treasurer, and Dr. Perry A. Ratcliff, Editor. For details of the meeting write the Editor at 1998 D Street, San Bernardino California.

The Relationship of the General Adaptation Syndrome to the Periodontal Tissues in the Rat*

by PERRY A. RATCLIFF,** D.D.S., *San Bernardino, California*

THE relation of the periodontal tissues to non-specific adverse influences on the body has not been adequately studied. Sandler and Stahl reported greater incidence of periodontal disease in hospitalized patients having systemic degenerative diseases as compared to patients admitted for therapy of other than degenerative diseases. Glickman and Shklar reported the autopsy of five rats that were placed in the alarm reaction by the subcutaneous injection of formaldehyde. Many other studies have been made for the evaluation of damage that might be attributable to a specific adverse influence. No report has been made of changes in the periodontium in the more advanced stages of the general adaptation syndrome.

The general adaptation syndrome of Selye is a triphasic, non-specific, adaptive reaction comprising: (1) the alarm reaction, (2) the stage of resistance, and (3) the stage of exhaustion. The adaptive reaction of the organism is the result of an agent producing stress, known as a stressor. The stressor may be local or systemic. Stress is the sum of all non-specific biologic phenomena including both damage and defense.

Selye states "It appears that in case of emergency the pituitary tends to produce more adrenotropic hormone and less gonadotropic hormone than under normal conditions. The reason for this is probably that, under such conditions, an abundant supply of the life maintaining principle of the adrenal cortex is a more imminent necessity than the preservation of normal sex function." This physiologic adaptive reaction is known as the hypophyseal shift.

*Read before the Federation Dentaire Internationale, Copenhagen, Denmark, August 18th, 1955.

**Department of Oral Biology, University of California, College of Dentistry, San Francisco, California.

Weight in Grams of Controls

	A	B	C	D	E	F	G	H	I	J	Av
SPLEEN	397	551	780	431	478	550	335	446	429	568	543
THYMUS	405	385	283	346	258	463	327	310	326	404	366
OVARY	20.9	38.1	20.4	26.6	25.9	30.1	17.9	36.1	52.5	21.1	29.3
ADRENALS	56.4	58.0	60.5	49.7	15 *	42.9	17.1	40.8	27.3	10.9	32.7

Weight in Grams of Stressed Animals

SPLEEN	116	125	94	128	164	115	142	127	116	84	120
THYMUS	55	109	559	64	180	82	69	402	79	96	78.2
OVARY	32.1	49.3	15.7	20 *	32.1	17.9	33.1	17	548	29.9	18
ADRENALS	45.2	47.3	45.9	50.7	15.5	46.9	14.4	45.3	33.5	22 *	31.3

* ONE SPECIMEN ONLY TAKEN

Fig. 1.

The female sex organs undergo involution as a result of non-specific stress. With gonadal involution, there is a reduced secretion of the female sex hormones. Since estrogen is a specific stimulant to osteoblastic activity and to the germinal layers of epithelial tissue, a study was initiated to determine what changes might take place in the periodontium in the more advanced stages of the general adaptation syndrome.

METHOD

Twenty rats of the Sprague-Dawley strain were used in the experiment. Ten rats were kept as controls, and fed on

Weight in Grams of Controls

	A	B	C	D	E	F	G	H	I	J	Av
28/1/54	150	152	150	142	146	148	140	154	150	150	148
31/1/54	164	164	168	148	156	158	150	174	162	158	157

Weight in Grams of Stressed Rats

	A	B	C	D	E	F	G	H	I	J	Av
28/1/54	152	148	144	150	148	144	148	137	154	132	146
31/1/54	104	104	100	102	112	100	102	100	102	88	102

Fig. 2.

Fig. 3. Section of a normal gingival papilla of the rat. The superficial layers of cornified epithelium are intact. The apparent junction of oral and enamel epithelium is intact.

Fig. 4. Section of a gingival papilla taken from a rat in the stage of adaptation. There is some sloughing of the superficial layers of epithelium. There is a small split at the junction of the oral and enamel epithelium.

Purina fox Chow. Ten rats were stressed by immobilization and withholding of food for a period of 68 hours. Immobilization was achieved by wrapping the legs of an animal with adhesive tape, forming a tab which was thumbtacked to a board. Care was taken to prevent injury or hurting the animals in any manner. Stress was induced by the mental frustration of captivity, the fatigue of continuously unsuccessful efforts of the rats to free themselves, and the temporary withholding of nutrients.

Cytology studies were made of both the gingival and vaginal mucosa using the histochemical technique of Papanicolau. Smears of animals were made at twelve hour intervals from the beginning of the experiment until autopsy. All animals were weighed at the beginning and end of experiment. Since the General Adaptation Syndrome causes adrenal hypertrophy, thymicolymphatic involution, and gonadal involution, for all animals weights were taken of adrenal glands, thymus glands, spleen and ovaries.

OBSERVATIONS

During the 68 hour period of the experiment the average weight gain of ten control animals was 6.35%. During the same period of time the ten animals subjected to stress lost an average of 43.15% of their body weight. (Fig. 1).

Sixty-eight hours after the initiation of the experiment, all animals were autopsied. Animals A through I in the stressed group were found to be in the stage of adaptation as indicated by a normal adrenal vascular supply. Animal J was in the stage of exhaustion as evidenced by the presence of adrenal hyperemia. Weights were taken of the spleen, thymus, ovaries, and adrenal glands. In a comparison of the averages of the weights of these organs, the stressed animals had a reduced weight of the spleen

Fig. 5. Section of a gingival papilla taken from the rat in the stage of exhaustion. There is marked sloughing of the superficial layers of epithelium and there is a deep split at the junction of the oral and enamel epithelia.

of 76.6% and the thymus of 78.8%, as compared to the spleen and thymus of the controls. The average weight reduction of the ovaries was 7.8% and the average weight of the adrenals was 6.1% as compared to the controls. (Fig. 2).

Autopsy indicated that nine of the stressed animals were in the stage of resistance and one was in the stage of exhaustion. No histological significance, except severity of degeneration, could be found in the sections of the periodontal tissues between the stage of adaptation and the stage of exhaustion. (Fig. 3, 4, and 5).

As compared to the controls, the stressed rats had a marked sloughing of the keratinized layers of the free gingival epithelium. The epithelial attachment remained intact. There was a definite split that occurred in the epithelium within the gingival sulcus. This occurred at the junction of the enamel and oral epithelial cells. This finding was not consistent with the interdental papilla which was more normal. Oral and vaginal cytology studies indicated a progressive desquamation of epithelium as the experiment advanced. Vaginal desquamation was more marked than oral desquamation.

With Mallory stain, as a result of stress there was evidence of degeneration of the collagen fibres, particularly in the free gingival portion of the periodontal membrane. Within the principal fibres of the periodontal membrane there was a marked reduction of osteoblasts and cementoblasts. However, some formative cells still remained, particularly at the points of stimulation by tension.

SUMMARY

Ten rats were stressed to determine changes in the periodontium during the

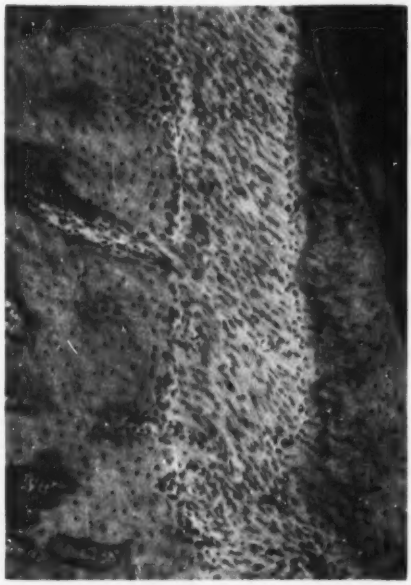

Fig. 6. Section taken from the principal fibres of a control animal. The cementoblasts are lined up in a row along the margin of the cementum. Also, the osteoblasts are lined up along the lamina dura as a distinct row of formative cells.

Fig. 7. Section taken from animal J which was in the stage of exhaustion. Note the marked difference in the number of formative cells present. A few cementoblasts remain in an area where cementoblastic activity has been high as evidenced by the quantity of cementum present on the adjoining root surfaces. Very few osteoblasts remain in apposition to the lamina dura.

more advanced stages of the general adaptation syndrome. No histological difference was found between the stage of resistance and the stage of exhaustion except that the findings were more pronounced during exhaustion.

Sloughing of the keratinized layers of epithelium occurred in the gingival tissue. A split of the papilla occurred at the junction of the oral and enamel epithelial cells. Degeneration of the connective tissue of the periodontal membrane was evident. Osteoblasts and cementoblasts were reduced in number.

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JOSEPH R. WALSH, D.D.S.

1898—1955

Dr. Joseph R. Walsh, periodontist at the Jersey City Medical Center, died at his home in Short Hills, New Jersey on November 25, 1955. Although he had been in poor health for several years, his death was sudden. Dr. Walsh was one of the older members of the American Academy of Periodontology and gained many friends in this organization. His activities to promote periodontology were noteworthy until he was hampered by ill health. Most of the older members of the Academy will remember him as an outstanding individual and capable periodontist.

The Use of the Minnesota Multiphasic Personality Inventory as a Diagnostic Aid in Periodontal Disease—A Preliminary Report

by SAMUEL CHARLES MILLER, D.D.S.,* JACK L. THALLER,** D.D.S. AND ALEXANDER SOBERMAN, D.D.S.,** *New York, N. Y.*

THE disturbed psyche and its attendant chronic stresses, strains and emotional changes can and frequently do alter the static composure of the body. That these factors definitely affect the homeostatic relationship is an established fact.[1, 11, 12, 13, 14] Since it has also been shown that there is no single etiologic agent which can produce periodontal disease, that local and systemic factors must both be present,[2, 3, 4] if some method could be used to evaluate the degree of emotional involvement, perhaps another valuable instrument could be added to our armamentarium for the diagnosis and treatment of periodontal disease. It was for this purpose that this study was undertaken utilizing the Minnesota Multiphasic Personality Inventory.

The M.M.P.I. is a psychometric instrument designed to provide in a single test, information on all the more important phases of personality. It consists of 566 statements concerning a wide range of subject matter from the physical condition of the subject to his moral and social attitudes. The individual is asked to fill out the M.M.P.I. form as follows: to mark all the statements either "true," "false" or "cannot say." The resultant score measures the following personality patterns:

(a) Hypochondriasis
(b) Depression
(c) Hysteria
(d) Psychopathic deviation
(e) Masculinity and femininity
(f) Paranoia
(g) Psychastenia
(h) Schizophrenia
(i) Hypomania
(j) Anxiety neurosis

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The anxiety neurosis is the emotional scale with which we were chiefly concerned in this study. Cameron[10] defines the anxiety state as "characterized by the presence of persistent heightened skeletal and visceral tension which disturbs a person's habitual rhythm of living and predisposes him generally to give exaggerated and inappropriate responses to relatively slight provocation."

The M.M.P.I. has been used for the past decade for preliminary psychiatric screening in counselling centers, military services, etc. to help confirm or clarify psychiatric disorders.[5] Ellis[6] made a study of the validity of the personality inventories and then correlated them with various types of objective criteria and concluded that "among the newer questionnaires, the M.M.P.I. appears to be the most promising one, and gives evidence of positive validity."

There is much discussion about the value of the items used in the structural type of personality inventory. It must be remembered that questions on personality inventories are not important as facts, per se, but rather as indications of how an individual feels about the items. It is not important whether a subject does or does not have frequent colds when compared to others. The important factor is that such a person dwells upon the fact that he has frequent colds and therefore appears to worry about his health. It is the cumulative effect of a number of items of this nature which permits the identification of those individuals with an abnormal concern over their health. The M.M.P.I. is only a *diagnostic aid* and it indicates only *what* not *why*. The M.M.P.I. only identifies the psychological state.[7]

METHOD

The M.M.P.I. was administered to fifty (50) patients at New York University

College of Dentistry who had been diagnosed by the Department of Periodontia and Oral Medicine as having periodontal disease. These patients were chosen at random, the only requisite being the ability to read and write. They were given the M.M.P.I. forms and instructed on the purpose and method of answering the inventory. The scores of these subjects were established by Janet Taylor[8] of Northwestern University who did the original work on the anxiety scale of the M.M.P.I. Each of the patients' answers was compared to that master chart. If the answer to a

FIGURE 1

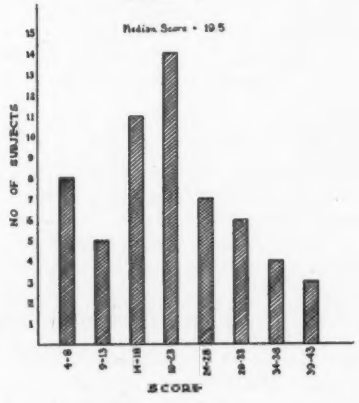

Fig. 1. Median Score = 19.5.

statement in the patient's booklet corresponded to the one on the master chart, the patient scored one. The total of these points gave the individual score which was tabulated with the following in mind:

1. To see if a correlation exists between periodontal disease and the anxiety scale of the M.M.P.I.

2. To determine whether or not a correlation might exist between the rapidity of alveolar bone destruction (Miller Classification) and the anxiety scale.

3. Could the anxiety scale be extracted from the entire inventory and still be useful as a diagnostic tool.

RESULTS

The scores which were obtained ranged from a low of four (4) to a high of forty (40), the maximum possible score being fifty (50). The number of subjects obtaining a particular score was plotted against the scores received (in units of four). The median score was 19.5 (Fig. 1). Taylor established the median score for the following investigations:

(a) At the State University of Iowa with 1,971 students participating, the score was 13.2.

(b) With 103 patients participating at a state psychiatric institute, a median of 33.9 was established.

R. J. Silverman at New York University[9] established a score of 14.5 with 160 college students participating.

An attempt was also made to see if a possible relationship might exist between the rapidity of bone degeneration and the degree of anxiety. The patients tested were classified according to slow or rapid alveoloclasia. The results follow:

Type	*Anxious*	*Not Anxious*	*Total*
Slow	9	14	23
Rapid	16	11	27
Total	25	25	50

On the basis of these figures a chi square of 2.012 and a $p = .20$ were obtained, the chi square being a method of evaluating the experimentally determined results to be expected on some hypothesis and the "p" value a level of reliability. It is generally accepted that the chance factor should not be greater than 0.05.

CONCLUSION

The results obtained in this preliminary investigation seem to indicate that a positive correlation between periodontal dis-

ease and the anxiety may exist and that this can be evidenced by the use of the Minnesota Multiphasic Personality Inventory. It is of interest to note that the median score of 19.5 while considerably lower than the 33.9 of the psychiatric study, is higher than the groups at both Iowa State and New York Universities where the scores were 13.2 and 14.5 respectively.

While the findings in the evaluation of the degree of bone loss are questionable, since the $p = .20$ signifies that 20% of the results may be due to chance, still the reliability may be increased with further study. It may even be possible to reduce the original 566 statements to a mere 50 and thus facilitate the administration and scoring. This investigation is being continued with these and other similar aims in mind.

In any event, while the experimental results may be questioned, the importance of this problem can hardly be overlooked. The trend and the pattern exist. It now remains for further investigative work to substantially prove the hypothesis.

SUMMARY

1. The Minnesota Multiphasic Personality Inventory was administered to fifty (50) patients chosen at random with periodontal disease.

2. The median score obtained was lower than that of a psychiatric group but higher than those groups of students at Iowa State and New York University.

3. There is a questionable correlation between rapidity of bone loss and degree of anxiety.

4. There is apparently a positive correlation between the anxiety state and periodontal disease.

5. Study of this problem is being continued.

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Occlusal Equilibration in Abnormal Occlusions

by HAROLD R. SCHREIBER, A.B., D.D.S.,* *St. Louis, Missouri*

OCCLUSAL equilibration has been generally accepted as an integral part of periodontal therapy. While trauma from occlusion in the majority of periodontal cases is a secondary etiologic factor, there is a group of instances in which trauma from occlusion may assume primary significance. These are cases in which periodontal disease occurs when the only local alteration to which a tooth or teeth is subjected is one of occlusion.[1] This is apparent in cases involving cantilever bridges or periodontally healthy teeth which have extruded or migrated. The same is true also in the certain types of abnormal occlusions which will be described in a later paragraph.

The technique of occlusal equilibration has been refined over a period of years and organized into definite and systematic procedures in the various texts. It has been pointed out that occlusal equilibration along with orthodontic and prosthetic procedures are to be considered before occlusal adjustment, and that either one or a combination of procedures might be necessary.

The initial objective of any occlusal adjustment procedure is the establishment of harmony of centric relation and centric occlusion. The discrepancies in centric relation and occlusion are usually caused by premature contacts which cause the mandible to be displaced. These mandibular displacements can be in an anterior, lateral, posterior, antero-lateral, or postero-lateral direction.[2] In the majority of periodontal cases mandibular displacements are of small dimension (fraction of millimeter) and can be easily corrected by occlusal equilibration. The amount of grinding in such cases is usually quite small. There are, however, a group of cases exhibiting abnormal occlusions that would require large amounts of grinding and in which ordinarily occlusal equilibration techniques are not used.

These cases of abnormal occlusions are as follows:

1. Open bite relationship of mandible to maxilla,

2. Crossbite relationships caused by anterior or lateral displacements of mandible,

3. Partial - intercuspating occlusions caused by anterior or lateral displacements of mandible.

Open bite relationship of mandible to maxilla are those cases in which there may be occlusal contact on one or two posterior teeth and no further contact anteriorly, the amount of space between mandibular and maxillary teeth increasing anteriorly. These cases may or may not exhibit mandibular displacement. They require before correction a complete occlusal work-up which should include occlusal history, radiographs, jaw position studies, study casts, and bite registrations. The end result must be visualized before attempting equilibration. Some open bite cases may be completely closed with occlusal equilibration. In others, only partial closure of the bite may be accomplished and prosthetic reconstruction then becomes necessary to complete the course. Large open bite cases require a tremendous amount of grinding in order to retain the anatomy of the opposing teeth. Considerable reshaping of various cusps and corresponding fossas must be done so that the teeth intercuspate properly when brought into contact. In severe cases the bite may have to be closed over a period of three or four weeks to allow the patient gradual adjustment to new positions of mandible. The case in illustration (Fig. 1, upper) is one in which occlusal contact was present in right third and second molar areas and left third molar area. The opening between anterior teeth measured four millimeters. Since the third

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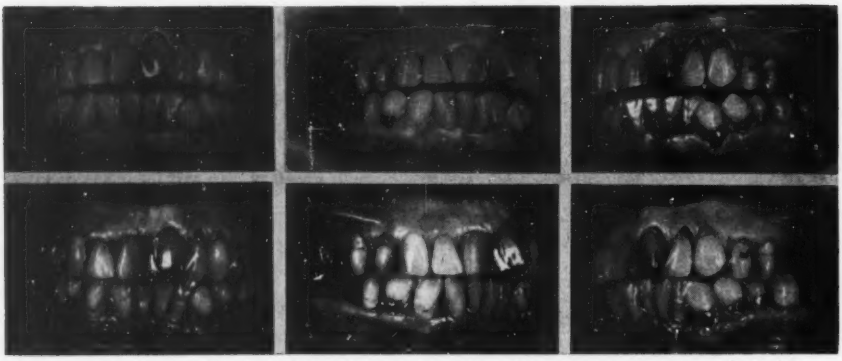

Fig. 1. (Upper)—Pre-occlusal equilibration. (Lower)—Post-occlusal equilibration.

molars were so periodontally involved, they were extracted. The case was then equilibrated to close the bite completely as shown in Fig. 1 (lower).

Crossbite relationship of the teeth caused by anterior or lateral displacements of the mandible are not true crossbites. They may be anterior or lateral crossbites or a combination of anterolateral crossbites. These types of cases must again be thoroughly diagnosed and the full outcome realized, since partial attainment is usually not satisfactory. In most cases, complete elimination of the crossbite is the desired goal. Anterior crossbites should not be corrected if the anterior teeth cannot be brought at least into an edge-to-edge relationship. Correction of lateral crossbites should achieve a sound intercuspation of the posterior teeth. The case in Fig. 2a illustrates an anterior crossbite. Fig. 2b illustrates the premature contact and the amount of grinding to achieve an edge-to-edge bite. Much reshaping of the articulating surfaces of the posterior teeth is necessary after the anterior teeth are brought into edge-to-edge relationship as shown in completion of case in Fig. 2c.

The case illustrated in Fig. 3a shows an antero-lateral (right) crossbite. Fig. 3b shows premature contacts and Fig. 3c the completed case with correction of crossbite. The case in Fig. 4 is a well advanced periodontal case with a severe anterior crossbite. Fig. 4b shows a three millimeter overlap of lower anterior teeth over upper anteriors. Fig. 4c shows case after equilibration with anteriors brought into edge-to-edge bite and posterior teeth in contact.

Anterior or lateral displacements of mandible due to premature contacts may result in partial-intercuspating occlusions. Here some teeth may be in occlusion, others may not intercuspate at all. The displacements in these cases are usually of large dimensions, two or three millimeters, as the patient slides from points of premature

Fig. 2. a) Pre-occlusal equilibration. b) Mandible in premature contact position. c) Post-occlusal equilibration.

Fig. 3. a) Pre-occlusal equilibration. b) Mandible in premature contact position. c) Post-occlusal equilibration.

Fig. 4. a) Pre-occlusal equilibration. b) Mandible in premature contact position. c) Post-occlusal equilibration.

contact to some intercuspating part of the loosely held occlusion. Considerable abrasion of occlusal surfaces may be evident as a result of large sliding movements of the mandible. Dual bites may also be exhibited in these cases. The final outcome must result in a correction of the mandibular displacement and the establishment of an intercuspating occlusion. Even after the equilibration some prosthetic reconstruction is usually necessary to improve the intercuspation. The case illustrated in Fig. 5 (upper) shows patient as mandible is displaced to left. In Fig. 5 (middle) the mandible is being held in premature contact position in which the mandible is

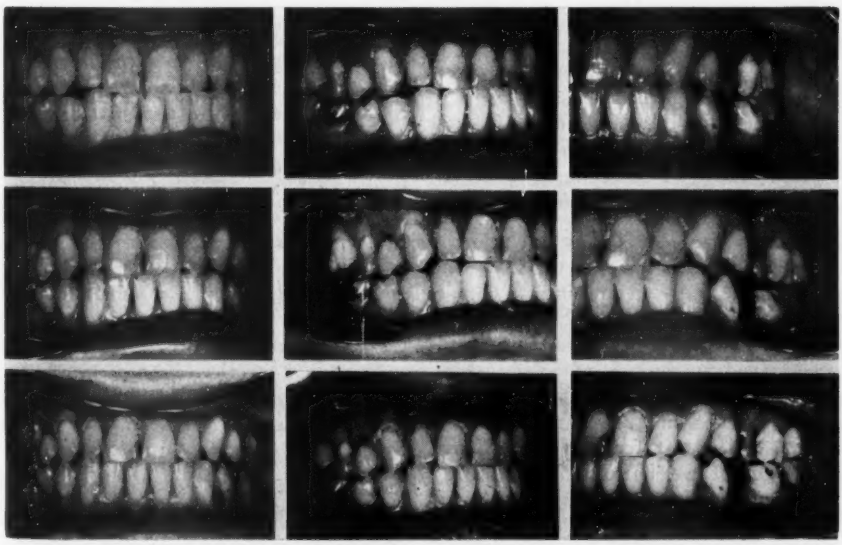

Fig. 5. Upper)—Pre-occlusal equilibration. (Middle)—Mandible in premature contact position. (Lower)—Post-occlusal equilibration.

three millimeters to right. In Fig. 5 (lower) the mandibular displacement is corrected after occlusal equilibration. A fixed bridge prosthesis was later placed to improve intercuspation on the left side.

SUMMARY

Occlusal equilibration technique can be used to correct such abnormal occlusions as open bites, crossbites, and partial-intercuspating occlusions. A complete diagnosis and visualization of the end result before correction are necessary. The ability to achieve the desired correction cannot be overstressed.

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The Uneven Distribution of Salivary Calculus in the Mouth

by FRANK G. EVERETT,* M.S., D.M.D., M.D., *Portland, Oregon*

THAT salivary calculus is most frequently and most heavily deposited on the lingual surfaces of the lower incisor teeth has been observed by most clinicians and has been explained in a variety of manners.[1] It is the purpose of the following short remarks to draw attention to a further possible reason for the predilection of salivary calculus for this particular site.

The sensation of taste has four primary modalities, namely sweet, sour, salty and bitter. Taste is perceived primarily on the dorsum and the margins of the tongue, the hard palate, the pharynx, tonsils, uvula and epiglottis. The mucosa of cheeks, lips, underside of the tongue, floor of the mouth and gingiva do not possess receptors for taste. The sensation for sour, proportional to the pH of the ingested material, is located in some of the fungiform papillae of the margins in the posterior part of the tongue.

Depending on which of the four primary modalities is prevalent in the ingested food, definite patterns of intraoral coordination are practiced as explained by Best and Taylor "One would no more think of sipping beer than he would of gulping a glass of wine, and a child prefers to lick, rather than munch a stick of candy."[2] When eating or drinking sour foods or liquids one instinctively brings the tip of the tongue rather heavily in contact with the tips of the lingual surfaces of the lower front teeth sealing off the lower parts of the lingual surfaces of these teeth from contact with the acid liquids; in other words, sour liquids are *sipped*.

It is therefore suggested that an additional reason for the prevalence of salivary calculus on the lingual surfaces of the lower front teeth may lie in the distribution of

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taste buds perceiving sour taste; this in turn causes a specific position of tongue, cheeks, and other muscular organs of the oral cavity which is peculiar for the ingestion of sour liquids, namely sipping. In this act the *lower lingual front tooth area thus is protected from contact with the sour materials, i.e. acids, thereby possibly favoring formation of calculus.*

Receptors for the sensation of sweetness are found most plentiful on the tip of the tongue. It is interesting to speculate about the possibility that localization of end organs for *sweet* taste and special coordinations of the oral musculature active when ingesting sweet foods may have a bearing on the distribution of *carious* lesions as well.

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ANNUAL SESSION AND MID-YEAR SYMPOSIUM OF THE AMERICAN ACADEMY OF ORAL PATHOLOGY

The American Academy of Oral Pathology will hold its annual session at the Hotel Woodner in Washington, D. C., on Sunday, April 8, 1956. An excellent program has been arranged and members and their guests are cordially invited to attend. There is no registration fee.

The Mid-Year Symposium of the Academy will be held on Monday, April 9th at the Armed Forces Institute of Pathology, the day following the Annual Session.

Doctor Arthur Purdy Stout will be the moderator and the subject of the symposium will be "Tumors of the Soft Parts."

Attendance at the symposium is limited to sixty with fellows and members receiving priority. There is a five dollar registration fee for the symposium.

For further information, contact the Secretary, Colonel Joseph L. Bernier, D. C., Armed Forces Institute of Pathology, Washington 25, D. C.

1955 PRESIDENT'S REPORT
to the American Academy of Periodontology

by HAROLD G. RAY, D.D.S., M.S., *San Francisco, Calif.*

IT is my privilege to welcome the members of this Academy to its 41st anniversary meeting and also to San Francisco. The officers and the committee on Scientific Sessions, with its sub committees, have worked zealously to make this meeting an enjoyable one for you educationally as well as fraternally. It is with deep appreciation and humility that I preside on this occasion and wish to thank you sincerely for this distinction.

The history of this Academy from its founding in 1914 has been one of steady progress and contribution to Dentistry, in executing the ideals and dreams of its illustrious fathers. There is now being written, under the able direction of Dr. Edward Spalding, a comprehensive account of these attainments which, when completed, should be thoroughly digested by each member and required reading for every candidate. To review the history of an organization such as this, is to stimulate projection into the future.

This Academy now stands at the threshold of a new era in which Periodontia has attained its maturity as a publicly recognized integral part of oral health and a teaching entity in our dental schools. Some of the problems precipitated by this attainment were accurately prophesied by several of my predecessors.

Our objective is eloquently stated in our constitution and it is my desire to speak to the projection of this objective into the future, while evaluating the situation obtaining today. There are three major categories I wish to discuss. The first is:

EDUCATION

This term must have a broad concept in the Academy's program and should embrace a responsibility toward all aspects of its development.

Our committee on Education, ably chairmanned by Dr. Frank Beube, has been doing an exemplary job of gathering the pertinent information so needed to execute our influence. I should like to take this opportunity to commend them highly for this ground work.

The general public and the general practitioner of Dentistry are alerted today to a consideration of periodontal disease and its effective management contributing to the composite picture of oral and systemic health. The term Periodontist and its connotation of service, has become familiar to our patients beyond all prophesy ten years ago. The demand therefore for skilled individuals in this category exceeds the supply and the responsibility for the bulk of diagnosis and therapy is placed upon the general practitioner. Much of this has been accomplished by the Academy's interest and the missionary work of its members.

If the above appraisal is correct our instruction to the undergraduate in Dentistry must be enhanced to meet the demand we have created. The periodontal teachers in our several schools are handicapped in method, personnel and physical facilities. We have come only lately as an integer in the curriculum and the task of insinuation and integration is arduous.

We need the Academy's help! This can be accomplished in several ways. First, the members, who are of necessity skilled in the background knowledge and therapeutic techniques, can offer their services either as regular instructors in Periodontics at a school nearest their homes or, and I think more important, be available as consultants for short periods to cover specific needs in any of our teaching institutions. This latter

Read at the 1955 meeting of the American Academy of Periodontology in San Francisco on October 13, 1955.

device ought to be thoroughly screened by one of the activities of the Academy, to select proper talent, to prevent repetition and correlate material. I would recommend that our American Board could well take over this aspect by receiving volunteers for this purpose, by evaluating the material and by scheduling availability.

I also envisage that these acceptable volunteers would be reimbursed by the Academy for their traveling expenses and subsistence during their participation in these assignments. I am well aware of the load the gentlemen of the Board are now carrying and which will be increased in the future. I feel however that they are the group in closest touch with our needs and with the stature to direct such a program. Their effectiveness could be enhanced by increasing the number of members of the Board and providing additional secretarial assistance. I want to take this opportunity to compliment our American Board in its effective discharge of its duties and the intelligent manner in which they handle a sometimes difficult problem.

The second way in which the Academy can facilitate undergraduate teaching is the sponsorship and direction of a workshop in teaching problems for the established educators in Periodontology. This is a sorely needed extension of our present teaching concepts. Most of our instructors are professional Periodontists and amateur teachers. It is desirable that they meet with one another for the pure discussion of teaching mechanics and benefit by the experience of others similarly motivated. The Academy has a wealth of talent waiting only to be tapped and its contribution in this direction should help to fulfill the need already created. I am aware that this responsibility also rests with the American Association of Dental Schools and to that end its Periodontia Section will conduct a small workshop, as an experiment, during their meeting next March in St. Louis. I am hoping that the Academy can send suitable representatives to this meeting to appraise the effectiveness of this device and subsquently formulate a plan to initiate such a workshop on a larger scale and more effective impact.

The third consideration under education is Graduate and Post Graduate preparation for specialization. This is a problem our Committee on Education, our Board in cooperation with the A.D.A.'s Council on Education and our Ad Hoc Committee under the able chairmanship of Dr. Joseph Bernier are studying diligently.

Specialization in Dentistry and Medicine has its merit and need. We must not forget however the admonition that Dr. Harry Lyons emphasized in his report last year, mainly to consider the whole of any educational facet. It is highly desirable that the Universities of the country organize and conduct graduate courses in Periodontology, leading to a degree. The graduates of such preparation would probably find themselves practicing as specialists but more importantly also as part time educators and research workers in the field. Preparation solely for specialization in practice should also be attainable through Post Graduate Courses either continued or intermittent. In my opinion, it is possible that our requirements for examination leading to certification are now too high. Periodontia is an essential part of the whole of Dentistry and I feel that the best possible preparation includes previous general practice which becomes enhanced by Post Graduate studies in the special field. From a practical standpoint it is most difficult for established practitioners to curtail their activities in order to return to school for a two year full time program. On the other hand this kind of education is quite possible to the very recent graduate who therefore comes to the Board with good academic background but little clinical experience which is tantamount to judgment, a specialist's greatest asset.

We must continue to study this problem carefully and be in a position to advise those directing these programs for a realistic solution.

The fourth and final consideration under education is the Academy's continued fostering of good Public relations. This is in accord with our objective and also the present curiosity and intelligence of the Public. Television, Radio and Magazine coverage of subjects relating to Dentistry and Medicine has increased many fold and and it is desirable that the Academy contribute in this direction. Our ever alert secretary only recently took the time to compliment, on our behalf, a national magazine for an excellent article pertaining to our interest. Our annual publicity committees now operate under the Scientific Sessions Committee and as such are usually composed of men located in the meeting city. They perform a heroic job but of necessity some of the continuity of a good public program is lost. I would suggest that we add another committee responsible to our Council which could be called a Public Relations Committee whose purpose would be the establishment of a good overall program of public education. The annual publicity committees for the Scientific Sessions could be a sub committee of this new group and their activities directed by the Chairman of the Council Committee. In this manner greater continuity could be achieved and more controlled information to the public disseminated.

The second category is:

RESEARCH

"To advance the science of Periodontology," according to our objective, it is necessary to embrace research. We are in the forests of confusion in respect to so many aspects of our problem that we must lend every effort to fostering and stimulating research wherever it can be prosecuted.

There are two ways, in my opinion, in which the Academy can aid in the proper support and encouragement of investigation.

One, is to charge the committee on research with the responsibility of correlating present projects under way and encouraging with advice and direction new projects in contemplation. This does not mean that research should be regimented or stilted in respect to individual endeavor but it could mean that projects would be carefully evaluated and correlated with similar investigations being conducted simultaneously. This function could serve, as I have previously suggested, as a clearing house for all research problems in our field.

The second manner in which the Academy can aid research is somewhat dependent upon the first and could also be pursued through the same committee.

The present allocation of available Federal funds to Dental Research is comparatively small. Some very worthwhile projects, bearing upon our field, have been passed on merit by the Dental Study Section but are not being prosecuted because of the lack of appropriations. The membership of the Academy is wide spread and I say advisedly is constituted by individuals not only skilled in their profession but prominent in their communities. These people could be called upon to contact individuals whose influence might be brought to bear upon the favorable allocation of the necessary funds for the consummation of some of these projects. Of necessity it would be paramount that the chairmen and this committee would have to be thoroughly familiar with the overall concept of research in Periodontology in order to take steps to throw the weight of the Academy in favor of any one or group.

This is a big job and would require a good deal of time of a most capable and honest committee but with extra secretarial help and probably support from the Academy it could be accomplished.

The third and final category to consider is:

ORGANIZATION

In the foregoing dissertation I have enumerated some projections into the future but in order to consider their feasi-

bility it is advisable to look inside our house and examine the machine which could motivate them.

We suffer from several growing pains and a changed environment requiring a more active function of our capabilities toward our objective.

I concur with many of my predecessors and the elder statesmen of our group that this Academy should live up to the name and definition of the word "a society of learned men united for the advancement of a particular science." That being the case it should be comparatively small, membership in it should be an honor, and it should pursue its objective. The present limitation of 300 *Active* members is compatible with this idea but there is a disproportion of doers and coasters. An honor society has an inherent disadvantage in that some individuals having once attained that honor lose desire for further activity. On the other hand the doers, few in number, find themselves saddled with ever increasing responsibility and in a natural zeal to preserve the spirit and ideals of a loved organization are loathe to trust untried capacities.

We need a proving ground for untried younger men who have acquired the qualifications for Active membership but who have not yet had the opportunity to demonstrate them.

The present practice of placing all candidates for membership in the Associate Classification, is not a good solution in my opinion. The Associate Classification, according to our present by-laws, has a distinct purpose and clearly states the requirements for attainment. We need this classification to encompass those individuals whose interest in Periodontia does not meet the qualifications for Active Membership, but whose interest in our field is part of their general interest in dentistry.

Here and now I wish to commend sincerely our present Membership Committee, capably chairmanned by Dr. Hunter Allen, who have diligently worked hard to meet the demands of the spirit of the Academy but who have been handicapped for want of a clear cut program adequately delineated in our by-laws.

I wish to propose a solution to the apparent paradox of the need for a proving ground and a resistance to using the Associate Classification for this purpose.

It is the establishment of regional sections of the Academy to function during the year in some concrete manner pursuing the advancement of our science. This can be accomplished by regular meetings, study activities, seminars and clinical demonstrations.

These sections would be composed of the Active and Associate members of the Academy, living in designated geographic areas. They would be headed by a chairman and secretary of their own election. They would also be privileged to invite promising individuals, in their area, to become provisional members of *that particular* section. These provisional members would be encouraged to take an active part in the program of the section and when and if their qualifications merited it they would be presented to the Membership Committee of the Academy for consideration for the membership classification to which they qualified. These candidates would come to the Membership Committee well documented, by the section officers, which would accomplish an actual double screening of prospective members.

In this manner the sections would be the proving ground for prospective doers who would be observed by men in their own locality who knew them best.

The original sections could perform another important function. For a long time your Council and more recently the Ad Hoc Committee have been considering the merits of establishing a requirement to maintain Active Membership. That this is a worthy consideration, in the overall projection, is obvious. If we are to limit the Active Membership the proportion of doers must be in the great majority. A requirement of regular attendance at the

annual meetings in order to maintain Active Membership is, in my opinion, not enough nor equitable. Even in this day of rapid transportation it becomes a hardship for some, so located, to travel often across the country to attend our annual sessions.

A requirement for the maintenance of Active Membership could be worked out to be a combination of service to the section as well as the Academy at large.

I would also envisage that the officers of the sections would meet with the officers of the Academy during the annual sessions. At this meeting the president of the Academy would preside and deliver a full report of their deliberations to the Council.

CONCLUSION

I have herewith presented some ideas in the direction of more adequately satisfying our objectives. These are motivated by the challenge of the change in our environment and the demand of the public.

I do not intend to imply or intimate that our present two major activities, the Annual Session and the Spring Conference, do not meet the objective. I do feel however that desirable as these two activities are they actually serve best those in attendance and of course facilitate the overall administrative program. My feeling is principally that these two highly desirable functions of the Academy must now be augmented by an overall program of service.

I realize full well that this suggested program would inundate our present administrative officers who are doing yeoman work in an exemplary fashion. Therefore I suggest that a new additional administrative officer be created, that of Program Director. This person would work under the direction of the Council and have the responsibility of directing this overall Academy program, not to be confused with the Scientific Sessions program chairman. His tenure of office should be more than a year and his election or appointment incorporated in the by-laws. He would be the coordinator of all these activities and be allowed to do a continuing job.

I am also cognizant of the fact that I have repeatedly, in suggesting this program, indicated a financial burden to the Academy which we, under our present structure, could not long endure. I feel confident however that if some or even all of this program were endorsed by you, certain foundations whose interest is the promotion of public health would consider financial assistance to consummate it. In order to solicit outside aid we must have a program and it should be properly presented.

And now, I have enjoyed this year as your president very much and since I had very little to do, because all administration in this Academy runs so smoothly and effectively, I have had opportunity to observe and to explore. I am very grateful for the honor you have bestowed on me, in allowing me to occupy this illustrious chair—made so by the sincere and conscientious occupants of the past.

I wish to thank all of the members of the various committees for the very real contribution they have made to another successful year and I know a successful meeting.

To Editor Maynard Hine our deepest appreciation and sincerest praise for maintaining the high standards of our Journal. This splendid activity under his intelligent direction has accomplished much toward our objective.

To our Secretary, Clarke Chamberlain, the highest commendation is not enough. He is a skilled administrator and a gentleman. To Jim Aiguier, our esteemed treasurer, goes the apple for Teacher—our finances, gentlemen, are in excellent hands.

And finally to our erudite and cultured chairman of the Council, Harry Lyons, I am sincerely grateful for his masterful direction of the Council.

The Periodontist in Never Never Land*

by WILLARD FLEMING, D.D.S., *San Francisco, Calif.*

ONCE upon a time there was a great and clever obstetrician. This great man attracted people of wealth, and eventually was given a large sum of money to build a new and modern delivery room on the obstetrical wing of a hospital. In addition to being a person of great professional competence, this man was also a scholar. It occurred to him that this delivery room should have an inscription over the door, one which should be thought-provoking and inspiring, and should impress each and every person who entered the surgery. After considering a number of mottoes and phrases, he hit upon the latin phrase "Primum non nocere." The usual translation of this phrase is "First Do No Harm," a worthy warning to those intrusted with the surgical care of the human body. In addition to being a capable obstetrician and a scholar, this man was also a cautious soul, so he sent this latin phrase to two professors of foreign language to determine if there were other possible translations. The first reply agreed that "First Do No Harm" was the usual interpretation, but there was also an alternate interpretation which was, "Don't Be Naughty in the First Place." While still rocking on his heels from the thought of this appearing over a delivery room, the obstetrician received a third translation which was, "No Harm in Just Once." Obviously there was too much dynamite in this for any delivery room, and to this day the only inscription over the door reads, "Labor Conquers All."

I have told this story to illustrate the point that words can be interpreted in more ways than one. The inscription or title of this paper is "The Periodontist in Never, Never Land." I selected this title because I have a mental picture of the periodontist as a lad who has never grown up; he dwells in the misty land of "Never, Never," a land inhabited by the practical pirates of local treatment, and the hard to observe systemic factor Indians, and all dominated by a curious tinker-bell terminology that flits about flashing "itis" and "osis" and occasional "ologies." If this interpretation is correct, it would appear that if Peter Periodontist is ever to grow up, he must leave this fairy land and stop searching for the shadow and seek the substance. Your interpretation may be something else again, and that is as it should be.

It might be of interest to review briefly the developments which form the background of periodontology's present position. We are not in a strong position and in my opinion the following items are some of the reasons why we stand with only one foot in the door of the dental profession. Again I should add, this is my interpretation and perhaps you have another.

1. Restorative dentistry arrived on the scene first and periodontics is a "Johnny-Come-Lately" in dentistry and the dental curriculum;

2. Caries and the results of caries are acute, dramatic, painful and not subject to delaying action, whereas the opposite might be said of the diseases of the periodontium;

3. Formerly, the dentist, just as the physician, was concerned mainly with the relief of pain and the restoration of function. It is only lately in both dentistry and medicine that attention is being given to the chronic and degenerative conditions;

4. Dentistry has worked out a precise and definite method of diagnosing and classifying caries and has developed precise and widely accepted indications for treatment. The treatment is successful, the pain is relieved, function is restored and the condition is subject to control. In periodontics the etiology is considered by many to be vague, diagnosis is complicated, and there is no generally accepted classifica-

*Read at the 1955 meeting of the American Academy of Periodontology, in San Francisco on October 13, 1955.

tion. There are great varieties of treatments, and combinations of treatments, and the indications for treatment are still the subject of indecision and controversy.

5. To a merchandise-minded public, dental restorations represent tangible evidence of a service performed, whereas in periodontics the hours of time involved in examinations, history taking, nutritional surveys, diagnosis and "cleaning teeth" represent little or no tangible evidence of service to the patient. In other words, it is easier for the dentist to justify fees for merchandise than for service. In view of changing attitudes, one wonders if such dentists are not "reaping a whirlwind."

6. Many of the dentists practicing and teaching today were attracted to dentistry because they were interested in a career that offered a service that is definite and precise, and predictable. The diagnosis and treatment of caries satisfies this desire. Periodontics does not.

So much for the external conditions that influence the status of periodontology in the eyes of the public and the profession. Let us turn to what we actually know about this disease condition. How does it relate to other lesions in the matter of treatment, control, and prevention?

All disease, like man, go through certain ages. My interpretation of this process calls for three ages, your interpretation may have more or less. Each age is based upon a growing knowledge of etiology, or cause. When the disease condition is first identified as an entity, our knowledge of cause is usually scanty, and the age of treatment is characterized by empiricism. Let us take typhoid as a disease that has gone the route. Less than 100 years ago we knew little of its cause. This was the period of empirical treatment: The ground-up tongue of a newt caught in the light of a new moon—or some such prescription. Later, as our knowledge of cause grew and we found that bacteria played a part, we were able by means of isolation and quarantine to control typhoid to some extent. Later still, when we found the mechanism by which it worked through the water supply, we were able to prevent typhoid. This development from treatment through control, and on to prevention is in direct relation to an increasing knowledge of cause. In any controllable disease, be it diabetes or caries, the control program depends on early examination, early diagnosis, and early treatment. This in turn depends upon an educated and an informed and cooperative public. This is why we have our councils on dental health, our health education in the schools, and our dental hygiene programs. Most of this has developed in the last thirty years, and in direct relation to our increasing knowledge of the cause of dental caries.

It is my opinion that dental caries and diabetes have emerged in the last thirty years from the age of treatment and are well along in the control era. It is not inconceivable that some of our young men may see caries as a preventable disease before they retire from practice. In passing I would like to point out the fact that all of the diseases now listed as preventable are no longer in the field of private practice, but are matters of public health. Regardless of what interpretation you may place on "public health dentistry" the fact will probably be that when caries does become a preventable disease, it will become a public problem and not one of private practice. Please do not worry at this point, as I do not believe this period is sufficiently imminent to cause anyone in this room to turn in his D.D.S. degree as the first payment on a master's degree in public health.

You will also note that periodontology is just emerging from the age of empirical treatment, and occupies about the same relative position as cancer, at least so far as our ability to treat and control it. Your interpretations of this may vary, but I think most of us will agree that our knowledge of the cause, treatment, and control of periodontal diseases are not as advanced as our knowledge of dental caries. In other words, the periodontist, because of his lack

of knowledge of etiology, is closer to the age of "treatment only" than is the dentist concerned only with caries. As a dentist I can in all honesty say to a patient, "If you do your part and I do mine I can control dental caries to a point where we will be able to maintain your teeth in a healthy and functioning condition." I do not say I can prevent caries, but I can control it. However, as a periodontist I cannot say this to a patient in regard to periodontal disease. I cannot say this because the knowledge of the etiology of periodontal disease is meager, and because the periodontist, partly through timidity, and partly through an unwillingness or inability to apply the basic sciences to his clinical practice, has confined himself largely to the study and treatment of local conditions.

One does not deny that periodontal disease is a most complex clinical problem; one does not deny that the external problems mentioned earlier have conspired to relegate periodontology to a minor position in the eyes of the public and the profession. However, one does deny that the segment of the dental profession that is interested in periodontal disease has shown any great amount of gumption in identifying some of the basic factors, and doing very much about them.

Let us go back some twenty or thirty years, and we find the periodontist worshiping at the shrine of the "local factor." True enough he passed out an offering or two to the systemic factor, but his heart wasn't in it. Merritt in his text in 1930 admits that there is some evidence that there is a type of "periodontoclasia" in which the primary factor is systemic in origin, "that atrophy of the alveolar process (is) due to *some* constitutional cause."

Stillman and McCall in their text stop beating the drums for traumatic occlusion long enough to say "that a deficiency of the deep tissues *may* be the primary fault. This deficiency *may* be due to heredity, or *may* be due to lack of vigorous function and retarded development in the earlier years of life. Possibly most important of all, it *may* be due to dietary deficiencies, this influence producing its most serious effects apparently when operating at a very early age."

In 1955, twenty years later, I read a graduate student's thesis in which he summarized our knowledge of the etiology of periodontal disease. The last paragraph reads as follows:

"It would be my conclusion that periodontal disease may be due to systemic or local factors, working separately or in combination and that the necessary prerequisite for the development of periodontal disease is some factor, either local or systemic, that will so lower the resistance of the oral tissues as to allow the usually commensal relationships in the mouth to become pathologic."

The same words and the same music! One recalls that less than a hundred years ago Pasteur and Koch were preaching that microbes would soon be found to be the cause of tuberculosis. Up rose a whole regiment of French physicians, headed by the bearded, frock coated, and brass buttoned, Dr. Pidoux. To quote from De Kreif: " 'What,' roared this Pidoux, 'consumption due to a germ—one definite kind of germ? Nonsense! A fatal thought! Consumption is one and many at the same time. Its conclusion is the necrobiotic and infecting destruction of the plasmatic tissue of an organ by a number of roads that the hygienist and the physician must endeavor to close'."

One wonders how meaningful our resounding phrases regarding the etiology of periodontal disease will sound eighty years from now. Periodontists should be concerned with all sorts of investigations relating the newer knowledge in the sciences to their clinical practice. Instead, we find them dividing into camps of conservative local treatment, and radical local treatment, and spending hours of time in defending these camps with endless discussions of minute changes in techniques. How

much better it would be to develop workable ideas and classifications showing the indications for each method of treatment, rather than to spend time and energy defending each method. Still more important would be the application to clinical practice of some of the things we are discovering in our pre-clinical sciences, particularly in the fields of pharmacology and biochemistry.

Terminology in periodontology has almost reached the status of a fetish among periodontologists, until one suspects they have little else about which to talk. I have no quarrel with proper usage of words but I do suggest that there are other important subjects that have a higher priority on our time. For example, one wonders how much of this program will be the same words with different music, or different words with the same music. The program tomorrow morning gives promise of a completely new song, I wonder what the attendance will be.

The American Academy of Periodontology represents that segment of the dental profession that is particularly interested in periodontal disease. Whether the Academy likes it or not, it must assume the role of leadership in developing periodontology in this country. Organizations such as this are not social groups made up of the "best people," but special sections of the dental profession dedicated to developing dentistry in certain areas, and with the total welfare of the people in mind. In other words, each of these specialty organizations should act as a catalyst within the dental profession. One wonders about the effectiveness of any professional organization whose membership policy is by invitation to membership and demonstration of achievement, rather than application for membership and demonstration of achievement. Are items other than the professional qualifications necessary? One does not deny the right of a group or organization to determine their own objectives in membership, but in view of the weak position of periodontal disease in the eyes of the public and the profession, it does appear that this organization should examine the part it is playing in providing leadership in this field.

Dentistry, and every segment of it, is badly in need of competent leadership. That area of dentistry that has to do with diseases of the supporting structures of the teeth is particularly vulnerable. Periodontal conditions are largely chronic and degenerative. Acute inflammatory conditions of the nose and throat are coming rapidly under control and other segments of the health profession are looking further afield. Those who perform tonsillectomies can also do gingivectomies, and those who are first to apply the newer knowledge of the preclinical sciences to the chronic degenerative conditions of the mouth will be the first to win the support of the public. In other words, it would appear that periodontology is in need of new ends or new objectives, and with these new ends we will need new means to attain them. The additional objectives should include the role of dynamic leadership in the development of periodontology and the role of a catalytic agent throughout the profession wherever periodontology is concerned. As was said before, these additional objectives will require new means to attain them.

Perhaps the most important of these means is an expanded research program on the etiology of periodontal disease, and a stepped up activity in the application of these findings to clinical practice. Another of these means relates to the undergraduate dental curriculum, which is in need of another periodic overhaul, particularly as it relates to the pre-clinical sciences and clinical practice. We can no longer afford to teach periodontology as an isolated subject with a minimum relationship to other parts of the curriculum. The entire dental curriculum needs to be organized on a vertical step by step basis and not as a series of subject hurdles over which the student jumps and goes on to the next hurdle, with little understanding of the relationships. Postgraduate and graduate courses in periodontology to some extent

are being taught at this level, but in name only. It still takes a bit of doing to fill in the required two years with worthwhile, useful studies. There are some who feel, with justification, that the present extent of our knowledge in periodontology does not justify two years of postgraduate work. State board requirements are badly in need of overhauling, and so the list goes. All of these are improved means to the end but unless the new objectives of leadership and catalyzer are developed we will see the old story of improved means to attain unimproved ends.

The American Academy of Periodontology is the one logical group in the dental profession that should assume leadership in setting additional objectives and new means to attain them.

The Academy should assume this leadership but it will have to give up chasing pirates and Indians and come out of Never, Never Land into the world where people grow up, and as they grow up, change to meet the changing world around them. This will not be easy; conditions vary throughout the country, there are the vested interests in the various organizations and dental schools; there is inertia, self-satisfaction, and plain human orneriness. However, these exist, and have to be faced, they cannot be overcome by wishful thinking.

In summary, it would appear that there are several things to be done. One of them is a period of soul searching by the American Academy of Periodontology. Does it really wish to assume the leadership in this segment of dentistry? If the answer is yes, it will need to make some readjustments, particularly in the matter of its membership. It would appear that a younger group of "doers," or fellows "on the make," would add a vitality, and subsequently a leadership, that is badly needed. Remember that the age from 25 to 45 represents an age of doing—of accomplishment. After 45 we tend to direct or to advise. A membership made up of directors is like an army of generals.

Basic to all of this, is a need for a greater knowledge of the cause of periodontal disease. It should be one of the prime objectives of the Academy, to stimulate research in this area and, (this is most important) to apply basic scientific knowledge to clinical practice.

The entire history of dentistry is the story of a struggle up from vocational status to true professional standing. The objective was attained by hard work and sustained effort. If there is such a thing as a self-made profession it is dentistry. Our dental forebears knew in their hearts the ultimate value of oral health and were willing to work for its place in the sun. I fully believe that periodontists as a part of that profession have the same sense of value of their subject, and are capable of the same performance.

In conclusion, I must admit that I have been critical, but what I have said about periodontists I have said about myself. My major interest in teaching, research, and practice has been in periodontology, and at least I can say that the comments made here today are from one of the family and not from an outsider.

The Periodontist as a Realist

by FRANK E. BEUBE, D.D.S., *New York, N. Y.*

ANYONE interested in the progress of periodontology, who heard Dean Willard Fleming's paper at the American Academy of Periodontology meeting in San Francisco, and those who will read its contents, will be stimulated by its provocative message. It was intended to shake some of us out of our complacency in accepting the present status of periodontology.

I cannot entirely agree with Dr. Fleming's analysis because some facts were incorrectly stated. I am certain there will be others who will also have contrary opinions to those presented by Dr. Fleming, and some who may differ with my concepts. This is as it should be as he expected differing viewpoints. The following statement is one area of disagreement: "Dentistry has worked out a precise and definite method of diagnosing and classifying caries and has developed precise and widely accepted indications for treatment. The treatment is successful, the pain is relieved and the condition is subject to control." He contends this is not true for periodontal diseases. It is my belief that if "Periodontal Diseases," were substituted for "caries," in this quotation, the total statement would be equally correct. Furthermore it is within the scope of every dentist in cooperation with his patients to *prevent* the largest proportion of periodontal conditions. Curative procedures are also available that can restore periodontal tissues to their original healthy state. This cannot be said for dental caries. I might add, that once a crown structure of a tooth is destroyed it can only be repaired by mechanical substitutes.

To discuss Dr. Fleming's remarks fully I have selected the following sequence:

(1) Terminology. (2) Etiology. (3) Prevention cure and control.

(4 Therapeutic technics. (5) Undergraduate and Postgraduate curriculum. (6) Research and Public health aspects.

(7) Responsibilities of American Academy of Periodontology.

(1) Terminology

Sincere and successful efforts on selection and use of words in periodontology have been made by the Nomenclature Committees of the American Academy of Periodontology since its founding in 1914. Obsolete and incorrect words have been discarded and an acceptable terminology as applicable to our present understanding of periodontology has been published periodically. This was done to provide dentists and dental teachers with a uniform nomenclature for their use. In spite of this procedure a few schools persist in following their own preferred terminology, and some dental writers on periodontal subjects still select such words as "periodontoclasia" to be included in their papers. It would be a simple matter for dental editors to have a list of terms and words accepted by the Academy, and for dental faculties also to read and accept this nomenclature, even if there were some disagreements. These disagreements could be decreased by further studies by nomenclature committees of the Academy. One of the most difficult problems to control is the enthusiastic author who creates his own, and frequently incorrect terminology for conditions and therapeutic technics, without having first consulted an accepted nomenclature, or neglecting to refer to dental or medical dictionaries for word usage. This is an editorial responsibility of dental journalism which is being avoided and shirked .

(2) Etiology

The etiology of the majority of periodontal diseases is so obvious that a review of them seems unessential. But if it appears vague to some of us, a brief description of them is justifiable.

It has been well established through ani-

mal experimentation and careful clinical and histopathological observations that local irritational factors are the causes of periodontal breakdown in most cases. These include supragingival and subgingival calculus and bacteria. Dental caries and malalignment of teeth which are conducive to food impactions. Incorrect anatomic contours of restorations on any or all their surfaces. These also cause food to pack and bacteria to collect in large masses. The gingivae is irritated, inflammation of the tisues follows, the bone is resorbed and periodontal pockets form. Occlusal traumatism, although not directly responsible for pocket formation, will induce bone resorption and pathological changes in the periodontal membrane. There are many others equally familiar to the general practitioner and periodontist, and universally accepted as the offenders of the periodontium.

Systemic diseases alone or in combination with local factors, can also have profound effects on the gingival tissue and attachment apparatus. These include chronic debilitating disorders, blood diseases, endocrine imbalances, and dermatological conditions such as scleroderma. But it should be remembered that periodontal pathosis initiated by these and other systemic diseases comprise a very small fraction of the total number of periodontal disturbances. The largest percentage are the result of local irritants. Our knowledge of the etiology of periodontal diseases is not complete, but because of this we should not be blind to those causes which are discernible.

(3) Prevention cure and control

Periodontal damage can be prevented by excavating dental caries, and inserting properly contoured and well fitted restorations before injury to the periodontium occurs. The condition can be cured when other causes such as defective restorations are replaced. The disease is also preventable by periodically removing the accretions on the teeth. It would be preferable of course to know fully, why calcific deposits accumulate and how to prevent their collection on the teeth. Malposed teeth and occlusal disharmonies with accompanying periodontal injury can also be prevented in these cases where the mandibular first molars were extracted without replacement.

Early and moderate disease of the periodontal tissues can be completely cured, and frequently the architectural form of the gingivae and bone are restored after treatment. Even some advanced periodontal cases are curable and controllable. Evidence of these findings can readily be obtained by observing the many preoperative and postoperative photographs published in text books and journals on periodontology.

(4) Therapeutic Technics

In respect to treatment methods, Dr. Fleming commented that periodontists are divided into "camps of conservative local treatment and radical local treatment, and spending hours of the time in defending these camps with endless discussions of minute changes in techniques." He further suggested that it would be much better "to develop workable ideas and classification showing the indication for each method of treatment." It seems to me that the first quotation is one that has been discarded by periodontists. Scanning through the most recent literature there appears little record of periodontists claiming that the conservative method alone is superior to the so-called radical procedure. The suggestion offered in the latter quotation is the trend to-day and adhered to by most authorities. That is, the integration of various technical methods to successful eradicate the disease. This viewpoint can be further elucidated in the following quote from the writer's text in 1953.*

"The appropriate approach in the treatment of gingivitis and periodontitis will be the selection of that method which will

*Periodontology Diagnosis and Treatment, The MacMillan Company, 1953.

effectively eradicate all pathosis and at the same time maintain as much of the periodontal tissues as possible. There is no necessary conflict between curettage and surgery to achieve these goals. Both curettage and surgery have a proper place in dental practice. Familiarity with the advantages and limitations of every type of treatment will enable the practitioner to select the most appropriate procedure for each set of circumstances."

(5) Undergraduate and Postgraduate Curriculum

The greatest weakness in disseminating the knowledge that has been accumulated regarding the prevention, etiology and treatment of periodontal diseases, is the incomplete training received by undergraduate students in dental schools. This conclusion is drawn from a report by the Committee on Education of the American Academy of Periodontology published in April 1955 issue of the JOURNAL OF PERIODONTOLOGY. This Committee made a survey of undergraduate education in periodontology at dental schools, in the United States and Canada. The findings obtained from 43 schools disclosed that as little as 20 hours were assigned for teaching periodontology in one school, and an average for the 43 schools of 113 hours for all lectures and instruction in the clinic. It is not possible to teach the fundamentals of periodontology within the scope of these time assignments.

Since insufficient teaching hours were allotted for the clinical aspects of periodontology, it is unrealistic to assume that this subject was properly correlated to the preclinical sciences. The inadequately trained dental students upon graduation, cannot cope with the widespread periodontal disease problems that confronts them in their dental practices. They incorrectly conclude, as did Dr. Fleming as shown in his table, due to lack of information, that diseases of the periodontal tissues are not preventable, barely controllable or curable. Extractions for these conditions is the only successful therapy to which they subscribe. The end result is that a large percentage of our population, become unnecessarily edentulous, believing very little if anything can be done for their diseased tissues. When any of these misinformed patients present themselves to dentists, who are adequately and properly oriented periodontally, they have difficulty in educating these patients to accept the proper perspective of periodontics. This is understandable because the concept of prevention and cure is diametrically opposite to what they were told by their former dentist in whom they had full confidence. Their new therapist who is ethical must find devious means to protect the preceding dentist.

After a number of years in practice, the alert dentist recognizes that some of his cases fail because of incomplete knowledge of periodontics. They seek out postgraduate courses in periodontology and some of his problems are solved. If such a practitioner is attracted to the field of periodontology, and wishes to limit his practice he is required to study for two academic years in order to be eligible for examination by the American Board of Periodontology. Dr. Fleming believes schools are hard pressed to properly fill this time with subjects related to this specialized field. It is my opinion that because most dentists have been inadequately trained, they will require two full years to become an expert in periodontology, especially in the clinical phase. If postgraduate students had been instructed in the basic periodontal principles at the undergraduate level then less time would be needed for postgraduate study.

(6) Research and Public Health Aspects

Additional experimental studies and clinical investigations must be instituted before complete understanding of the etiology, prevention, and treatment of periodontal diseases can be placed on a full scale public health program, such as is done for typhoid. A few representative problems that are still to be resolved, in-

clude the precise pathogenesis of periodontal diseases. Information is negligible regarding the greater susceptibility of periodontal tissues in some patients and much less in others. It is not known why the periodontium of some patients respond fully to treatment and others not at all, or only partially.

If, through research it could be determined why accretions form and collect on teeth and means could be developed to prevent their accumulation, then a large proportion of periodontal diseases would be prevented and the dental profession could present an excellent public health program. Until this is accomplished, all dental students and practitioners should be thoroughly indocrinated in respect the truly known and established facts regarding periodontal diseases. The public should also be periodically and regularly informed that local irritants is the major cause of their bleeding gingivae. At the same time calling attention to possible systemic factors. If this was done the profession would accept their responsibility and the laity would request treatment instead of believing what they have heard; that "Pyorrhea" is not curable.

(7) Responsibilities of American Academy of Periodontology

The American Academy of Periodontology should be the spearhead for bringing attention to the dental profession, educators, the public, and the American Dental Association all aspects of periodontology. The Academy should have and does accept the further responsibilities of studying and evaluating the status of periodontal research, and that of dental education in general and the curriculum of periodontology in particular, and to be prepared to offer suggestions for improvement. The projection of the Academy's objectives was clearly and succinctly outlined by Dr. Harold Ray in his president's report to the Academy, published in this issue of the journal. If Dr. Ray's proposals received wide acceptance by dental schools and the profession, with whatever modifications seemed essential, then many problems concerning periodontal diseases and the teaching of periodontology would be resolved.

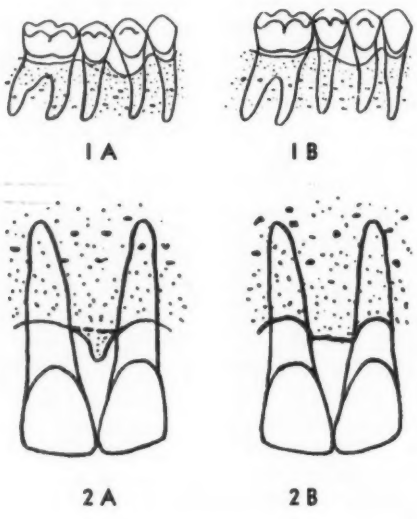
Letter to the Editor • • • •

A recent article published in the Journal (Friedman, Nathan: Periodontal Osseous Surgery: Osteoplasty and Osteoectomy, J. Periodont. 26:257-269, Oct., 1955), contained the following statement "the principle of osseous resection was conceived and presented by Schluger." The article by Dr. Saul Schluger referred to in this statement was entitled, "Osseous Resection—A Basic Principle in Periodontal Surgery." It appeared in Oral Surgery, Oral Medicine, and Oral Pathology in March 1949.

I am taking the liberty of correcting the erroneous impression which might be created by Dr. Friedman's statement regarding the conception of the principle of osseous resection. The principle of osseous resection as an adjunct in periodontal therapy was described by my father, Fermin A. Carranza, Sr., of Buenos Aires, as far back as 1935 (Tratamiento quirurgico de la paradentosis, Tesis de Dostorado, Univ. de Buenos

Aires, 1935). Although the removal of alveolar bone in the course of periodontal treatment had been described earlier, my father focused attention upon osseous resection by stressing the rationale upon which it was based, and explaining the exact manner in which the removal of alveolar bone might expedite the treatment of periodontal pockets under special circumstances.

Carranza, Sr. subsequently elaborated upon the subject in another paper, (Cuando y porque sacrificar hueso en el tratamiento de la paradentosis, published in Anales del Ateneo del Instituto Municipal de Odontologia de Buenos Aires 3:311-317, 1941, and reprinted in Revista Odontologica 30:644-651, Oct. 1942). His articles describe many indications for osseous resection some of which were illustrated diagrammatically.



I trust you will forgive a devoted son who reads more than one language for calling attention to the work of his father which originally appeared in Spanish, and apparently may have been overlooked because neither Dr. Friedman nor Dr. Schluger made reference to it in their papers.

Fermin A. Carranza, Jr., Assistant
Professor of Periodontology
Tufts University School of Dentistry

Announcements • • • •

AMERICAN ACADEMY OF PERIODONTOLOGY

SPRING CONFERENCE APRIL 30, MAY 1, 2, 1956

W. K. KELLOGG FOUNDATION INSTITUTE, UNIVERSITY OF MICHIGAN

All lectures will be held in Kellogg Auditorium.

Please make reservations early at the Michigan Union Building, Ann Arbor, Michigan.

MONDAY, APRIL 30

8:00 A.M.- 9:00 A.M. Registration. Room 2004 Kellogg Building.

9:30 A.M.-12:00 M. and 1:30 P.M.- 4:00 P.M. *The Role of Nutrition in Periodontal Disease*
Harry Roth, D.D.S., F.A.C.D.
Assistant Professor of Periodontia and Oral Medicine. College of Dentistry, New York University

TUESDAY, MAY 1

9:00 A.M.-12:00 M. *Bone Formation and Destruction*
Harry Sicher, M.D., D.Sc.
Professor of Anatomy and Histology
Chicago College of Dental Surgery, Loyola University

1:30 P.M.- 4:00 P.M. *Radioactive Isotopes in Dental Science*
Herbert J. Bartelstone, D.D.S.
Assistant Professor of Pharmacology
College of Physicians and Surgeons, Columbia University

6:00 P.M. *Social Hour and Dinner. Michigan Union*

WEDNESDAY, MAY 2

9:00 A.M.-12:00 M. *Periodontal Packs and Their Application*
W. G. McIntosh, D.D.S.
Associate Professor of Periodontology
School of Dentistry, University of Toronto

1:30 P.M.- 4:00 P.M. *Movement of Teeth—An Important Part of Periodontal Therapy*
Leonard Hirschfeld, D.D.S.
Assistant Clinical Professor of Periodontology
School of Dental and Oral Surgery, Columbia University

For further details write Dr. Elizabeth Downie, 1421 David Whitney Building, Detroit, Michigan.

BAYLOR UNIVERSITY COLLEGE OF DENTISTRY

The division of graduate studies, Baylor University College of Dentistry, Dallas, Texas, announces the following graduate courses of study in Periodontology, beginning in September, 1956:

1. A nine month course of graduate study in Periodontology, leading to the degree of Bachelor of Science in Dentistry. This course consists approximately half of advanced study in basic science and half of clinical study.

2. A twenty month course (two regular school terms and one summer session) of graduate study in Periodontology leading to the degree of Master of Science in Dentistry. This consists essentially of the B.S.D. course above, followed by a summer term of clinical experience and then a second full nine month term of advanced study in theory and clinical practice of Periodontology. A thesis is required.

Baylor has a modern school plant fully equipped for undergraduate and graduate study and completely air-conditioned. Every opportunity is offered the graduate student to prepare himself for the practice of Periodontology. For further information, write to the Registrar, Baylor University College of Dentistry, 800 Hall Street, Dallas 10, Texas.

THE UNIVERSITY OF ALABAMA
ANNOUNCES A RESIDENCY IN PERIODONTOLOGY

The University of Alabama School of Dentistry in conjunction with the Birmingham Veterans Administration Hospital offers a two year residency in Periodontology, which can lead to the Master of Science degree in Dentistry, if desired. Applicants, due to Veterans Administration regulations, must be American citizens.

For detailed information write: Joseph P. Lazansky, M.D., D.M.D., Associate Dean, Director of Graduate and Postgraduate Education, University of Alabama School of Dentistry, Birmingham 3, Alabama.

AMERICAN ACADEMY OF ORAL PATHOLOGY EXAMINATIONS

The American Academy of Oral Pathology will conduct its next examination for elevation to Fellowship on Saturday, April 7th, 1956. The examination will be held at the Armed Forces Institute of Pathology, in Washington, D. C., and will be conducted by the Fellowship Committee. Members of the Academy who wish to apply for permission to be examined for elevation to Fellowship, should contact the secretary, Colonel Joseph L. Bernier, Armed Forces Institute of Pathology, Washington, D. C., at the earliest practicable time.

The next examination for certification by the American Board of Oral Pathology will be held in Washington, D. C., on December 8-9, 1956. Application blanks and informa-

tion pertaining to the examination can be obtained from the secretary, Donald A. Kerr. D.D.S., University of Michigan School of Dentistry, Ann Arbor, Michigan.

All applications must be completed by July 1, 1956 in order to be eligible for the December examination.

THE AMERICAN INSTITUTE OF DENTAL MEDICINE

CASE HISTORY SERVICE

The Institute continues to offer Case Histories from the broad field of Dental Medicine for the year 1955-56. These will include original 35 mm. Kodachrome slides of the oral condition, pertinent laboratory findings, medical background, roentgenograms, histologic slides, photomicrographs, diagnostic criteria and whatever else may be indicated in each individual case. A loose leaf binder and matching Kodachrome slide box will be furnished each participant. The fiscal year of the Institute begins October 1st.

This monthly service began January 1953 and has met with outstanding success. During these three years it has provided nearly 250 enthusiastic members with 38 practical and useful Histories with 75 Kodachrome slides and valuable up-to-date information.

Anyone subscribing to this Case History Service is entitled to full membership in The American Institute of Dental Medicine. Members of the A.D.A. or A.M.A., or their foreign equivalent, are eligible to apply.

There are a few case histories available for the preceding years. Due to the great demand for this Service, it is recommended to subscribe at an early date for assured and immediate delivery.

For further information address all communications to the Secretary, Mrs. C. Novembri, 2240 Channing Way, Berkeley 4, California.

BETH ISRAEL HOSPITAL

OCCLUSAL ADJUSTMENT SEMINAR (MARCH 7-11, 1956)

An intensive five-day course will be offered which presents the principles and practice of occlusal adjustment and the relationship to periodontal therapy. Case management and treatment will be covered by lecture, laboratory and clinic work. Tuition: $200.00.

Co-directors of Seminar: Henry M. Goldman, D.M.D.; Bernard Chaikin, D.M.D.

PERIODONTIA SEMINAR (MAY 7-18)

A two-week seminar will be presented for the practicing dentist who wants to acquire basic information on the latest developments in periodontal therapy. Theoretical information is combined with practical clinic demonstrations. The course includes background

information in anatomy, physiology, pathology and etiology of periodontal disease but stresses diagnostic and treatment procedures. Tuition: $350.00.

Co-directors of Seminar: Henry M. Goldman, D.M.D.; Bernard Chaikin, D.M.D.

For further information and enrollment write to Coordinator of Education Programs, Beth Israel Hospital, 330 Brookline Avenue, Boston 15, Mass.

DR. ORBAN ANNOUNCES FORTHCOMING COURSES

For Dental Hygienists—April 5, 6, 7, 1956—Prophylaxis: Biologic Principles, Design of instruments, Instrumentation, Maintenance of sharp instruments.

Home-Care Procedures:

For Dentists—April 9-13, 1956—"Theory and Practice of Periodontics."

For further information, please write Dr. Balint Orban, 629 N. Nevada Avenue, Colorado Springs, Colorado.

UNIVERSITY OF ILLINOIS TELEVISION COURSES

Dr. Balint Orban, Professor and Head of the Department of Periodontics at Loyola University, directed the first television course presented by the University of Illinois College of Dentistry and has directed every television course in periodontics since. This is the seventh annual presentation. As in previous years, this course will be given immediately following the Chicago Dental Society Midwinter Meeting this year on Feb. 9, 1956.

Each year, Dr. Orban has progressively introduced areas in the field of periodontics essential to the general practitioner. This year, he adds a most important step to the successive order—mouth rehabilitation.

The entire day will be televised. The faculty, in addition to Dr. Orban, will include Dr. Bertram H. Downs of Colorado Springs, Colorado; Dr. Arthur Roberts of Aurora, Illinois; Dr. Harry Sicher, Professor and Head of the Department of Anatomy, Loyola University; and Dr. Beryle Ritchey, Colorado Springs, Colorado. Dr. Robert G. Kesel, Professor and Head of the Department of Applied Materia Medica and Therapeutics, University of Illinois College of Dentistry, will moderate the round table discussion.

The tuition fee for the course is Twenty-five ($25.00) Dollars. For details, write Postgraduate Division, University of Illinois College of Dentistry, 808 S. Wood St., Chicago, Illinois.

SIX STATE TELEVISION COURSE IN PERIODONTICS

A four session course on "Clinical Treatment in Periodontal Disease in General Practice" is to be sent live via television from the University of Illinois College of Dentistry to Chicago, Illinois; Cleveland, Ohio; Indianapolis, Indiana; Milwaukee, Wisconsin; Min-

neapolis, Minnesota and St. Louis, Missouri. This is the first time a course in dentistry has ever been televised over a closed circuit interstate network.

Fourteen of the nation's prominent educators and clinicians will teach the course. All phases of clinical treatment will be demonstrated, using live patients and specially prepared models. The clinicians' work will be reviewed and discussed by a well-known panel of viewers particularly selected because of their expert knowledge and skill in this subject. Each session begins at 7:30 C.S.T. The complete program follows:

1st Session—March 5, 1956:

Surgical Phase:

Gingivectomy—Dr. Henry Goldman—Boston, Mass.

Subgingival Curettage—Lt. Comdr. Erwin M. Schaffer—Camp Pendleton, Calif.

Special Surgical Problems—Dr. Saul Schluger—Jersey City, N. J.

2nd Session—March 12, 1956:

Occlusal Phase:

T. M. J.—Dr. John R. Thompson—Chicago, Ill.

Equilibration; Appliances and Splints—Dr. Lewis Fox—South Norwalk, Conn.

3rd Session—March 19, 1956:

Therapeutic Root Planing and Home Treatment—Dr. Balint Orban—Colorado Springs, Colo.; Dr. Frank Wentz—Chicago, Ill.; Dr. John Kollar—Chicago, Ill.

4th Session—March 26, 1956:

Round Table Discussion—Dr. Robert Kesel, Moderator—Chicago, Ill.; Dr. Edward Allen—St. Louis, Mo.; Dr. Raymond E. Johnson—St. Paul, Minn.; Dr. Albert H. Kniesner—Cleveland, O.; Dr. Delbert Nachazel—Milwaukee, Wis.; Dr. Henry Swenson—Indianapolis, Ind.

TUFTS UNIVERSITY SCHOOL OF DENTAL MEDICINE

Announcement of Graduate and Postgraduate courses in preparation for Specialty Board Certification or Advanced Degrees to be offered in the 1956-57 school year.

ORAL PATHOLOGY

Professor Irving Glickman

Oral Pathology is presented as a specialized phase of General Pathology. The histopathology of oral disease is correlated with clinical findings. In addition, the interrelationships of basic pathological changes in the oral cavity with systemic disease are emphasized. Considerable attention is also given to recent developments in experimental Oral Pathology. Experience in the diagnosis of routine surgical specimens is provided by the biopsy service of the Oral Pathology Department.

Oral Pathology I is an eighteen-months' course leading to the degree of Master of Science or Master of Dental Science. It is intended for individuals interested in pursuing academic careers in the field of Oral Pathology, and consists of: Didactic instruction in General and Oral Pathology; Participation in the biopsy diagnostic service, tumor clinics and seminars in General Pathology; Research and Thesis. The Oral Pathology

Department is engaged in an active research program which affords guidance and orientation for the graduate student.

Oral Pathology II, a one-year course leading to a certificate, is offered for individuals with a primary clinical interest who desire a background in Oral Pathology.

OCCLUSO-REHABILITATION III
GRADUATE COURSE LEADING TO THE M.S. OR M.S.D. DEGREE
Professor Louis Alexander Cohn

This is a full-time 18-month course. The curriculum is divided between the basic and applied sciences and clinical training in occluso-rehabilitation. Investigation of clinical problems in terms of basic science discipline is a partial requirement for the degree.

PERIODONTOLOGY
Professor Irving Glickman

The curriculum in Periodontology has been developed with a view toward the expanding interrelationships of modern periodontal practice with other phases of dentistry, medicine and biologic science. Sufficient flexibility of subject matter is permitted in the presentation of courses to afford the continuity and correlation of training so essential for a comprehensive educational background.

Periodontology I is a two-year specialist training program for individuals interested in qualifying for certification in Periodontia. It has been arranged in conformity with the requirements of the American Board of Periodontology. Approximately one-half of the course is devoted to didactic instruction, and the remainder to clinical practice. In addition to training in the Periodontia clinic, the student is given the opportunity of participating in clinics of allied dental and medical specialties. This wide range of clinical contact provides a useful background for expert management of periodontal problems.

Periodontology II, a one-year specialist training program, is a modification of the two-year course and is offered for individuals with a year's previous graduate or postgraduate training in Periodontology.

Periodontology III is intended for individuals with a primary interest in the academic and research aspects of Periodontology. It is an eighteen-months' course leading to the degree of Master of Science or Master of Dental Science in Oral Pathology. The course consists of the following subdivisions: I, Didactic instruction in pre-clinical sciences; II, Clinical training in Periodontology; III, Research and thesis. The facilities and guidance of the Oral Pathology Department and other departments of the medical and dental schools are available for research activities. Upon the completion of such a program, one may prepare for specialty board certification by spending an additional six months in clinical study.

ORAL DIAGNOSIS AND ROENTGENOLOGY
Professor John Barr

Graduate work in Oral Diagnosis and Roentgenology, leading to the degree of Master of Science or Master of Dental Science, is offered both for those desiring to become teachers or research workers, and for those who wish to broaden their diagnostic experience as a basis for subsequent practice. With Oral Diagnosis and Roentgenology as the major subject, a wide choice is permitted in the required minor subjects, with courses in General and Oral Pathology, Applied Anatomy, Cephalographics, Anthropology, and Education being especially recommended. The facilities and clinical material of the Division of Oral Diagnosis and Roentgenology are directly available to those preparing for the degree, together with the opportunity to follow cases through consultations with other clinical departments, thus assuring a wide clinical experience. Original research and presentation of a thesis are required of all candidates.

Application forms and further information regarding graduate study may be obtained by writing to the Director of Graduate and Postgraduate Studies, Tufts University School of Dental Medicine, 136 Harrison Avenue, Boston 11, Massachusetts.

COLUMBIA UNIVERSITY

A course on the Principles of Occlusion, PD 429, consisting of lectures, seminar conference and group participation, and clinical demonstrations will be given by Professor Lewis Fox and associates on May 23, 24, and 25, 1956 at Columbia University School of Dental and Oral Surgery.

This course is designed to present the fundamentals of occlusion of the teeth in relation to the physiology and pathology of the periodontal supporting tissues. The entire course will be directed toward correlating the principles of occlusion to clinical criteria and therapeutic endeavors.

The fee is $150. Registration must be made by March 15, 1956. For further information write to Postgraduate Division, School of Dental and Oral Surgery, 630 West 168th Street, New York 32, N. Y.

TEMPLE UNIVERSITY SCHOOL OF DENTISTRY

The Department of Postgraduate Studies announces a Four-Day Participating Course, May 3, 4, 5, 6, 1956 in "Occlusion And What To Do About It" under the direction of Bernard Jenkelson, D.M.D. of Seattle, Washington.

The course is limited to 20 members, and the fee is $100.00.

Make checks for deposit payable to: Dr. Louis Herman, Director of Postgraduate Studies, Temple University School of Dentistry, 3223 North Broad Street, Philadelphia 40, Pennsylvania.

NEW YORK UNIVERSITY ANNUAL WORKSHOP

Subject: Occlusal Equilibration.

An intensive participation course of five days, including theory, patient demonstration, participation on models, relationship to general dentistry and seminar workshop sessions.

A social program is included.

Date: June 11-15, 1956 inclusive.

Fee: $200.00 including textbook, instruments, and social program.

This course will be given by Drs. S. C. Miller, S. Sorrin, J. L. Blass, W. M. Greenhut, H. Roth, A. Arvins, A. Goldstein, L. R. Burman, G. Witkin, J. Obin, M. Hollins, M. Simring, I. Yudkoff. For further information kindly write to the Secretary, Postgraduate Division, New York University College of Dentistry, 209 East 23rd Street, New York 10, New York.

THE SECOND DISTRICT DENTAL SOCIETY AND
BROOKLYN VETERANS ADMINISTRATION HOSPITAL

present the

FIFTH ANNUAL CONFERENCE

on

MAXILLARY AND MANDIBULAR BONE

FRIDAY, MAY 4, 1956

MORNING PROGRAM 9:00 A.M. TO 12:30 P.M.

Chairman: ABRAHAM M. KLEINMAN, M.D., Director, Professional Services, Brooklyn VA Hospital

Introduction:

ALEXANDER W. KRUGER, M.D., Manager, Brooklyn VA Hospital

Development and Histology of the Jaws.

GERRIT BEVELANDER, Ph.D., Departments of Histology, College of Dentistry and Graduate School of Arts and Science, New York University

Metabolism of Bone.

PHILIP PERSON, D.D.S., Ph. D., Associate Professor of Biochemistry and Physiology, Bureau of Biological Research, College of Arts and Sciences, Rutgers University; Chief, Dental Research, Brooklyn VA Hospital

Localization in the Jaws of Systemic Derangements.

LESTER R. CAHN, D.D.S., F.D.S., R.C.S.(Eng.), Associate Professor of Oral Pathology, Columbia University; Consultant in Oral Pathology, Brooklyn VA Hospital

Environmental Factors Affecting Supporting Bone of Teeth.

S. SIGMUND STAHL, D.D.S., M.S., Assistant Professor of Periodontology, New York University; Attending in Periodontology, Brooklyn VA Hospital

Lunch and Tour of Hospital—12:30 to 1:30 P.M.

AFTERNOON PROGRAM 1:30 TO 4:30 P.M.

Chairman: WILLIAM HYDE, D.D.S., President, Second District Dental Society

The Surgical Management of Congenital Deformities of the Maxilla and Mandible.

MAURICE J. HICKEY, M.D., D.D.S., Dean, School of Dental and Oral Surgery, Columbia University; Consultant, Bronx VA Hospital

Fractures of Facial Bones—Diagnosis and Management.

WILLIAM F. HARRIGAN, M.D., D.D.S., Head of Department of Oral Surgery, New York University; Consultant in Oral Surgery, Brooklyn VA Hospital

Cysts and Tumors of the Jaws.

THEODOR BLUM, D.D.S., M.D., F.A.C.D., F.A.C.S., F.I.C.D., Consultant in Oral Surgery, The New York Institute of Clinical Oral Pathology and Brooklyn VA Hospital

Osteoplasty in the Treatment of Periodontal Disease.

SAUL SCHLUGER, D.D.S., Associate Clinical Professor, Columbia University and Member of American Board of Periodontology

All Dentists and Physicians Are Cordially Invited

GRADUATE COURSE IN PERIODONTOLOGY

The Graduate School of Medicine, University of Pennsylvania, and the Riesman Dental Clinic of the Beth Israel Hospital of Boston, sponsor a two year training program in Periodontology under the direction of Dr. Henry M. Goldman. The curriculum consists of one year at the Graduate School where emphasis is placed on the sciences, basic to dentistry and periodontology and the clinical phases of practice. The second year at the Riesman Dental Clinic is devoted primarily to the clinical practices of this specialty and research. A certificate will be awarded at the conclusion of the two year program. However, upon completion of the curriculum and a thesis, students would be considered for the degree of Master of Science.

For details, write Dr. Henry M. Goldman, Beth Israel Hospital, Boston 15, Massachusetts.

THE SEVENTH ANNUAL BERKSHIRE CONFERENCE IN ORAL PATHOLOGY AND PERIODONTOLOGY

The Division of Graduate and Postgraduate Studies of Tufts University School of Dental Medicine will conduct the Seventh Annual Berkshire Conference in Oral Pathology and Periodontology at Eastover in Lenox, Mass., June 17-21, 1956. The Conference will consist of four days of lectures, seminars, and panel discussions regarding the clinical problems by outstanding teachers and clinicians in dentistry, medicine and their related fields. A special feature of the Conference will be a clinico-pathological seminar with microscopes provided for all participants.

The curriculum is arranged so that mornings and evenings are devoted to professional activities with afternoons open for recreation. This is a conference for general practitioners as well as those interested in a specialized practice.

For details, application and reservation form write to The Seventh Berkshire Conference, Tufts University Dental School, 136 Harrison Avenue, Boston 11, Massachusetts.

DENTAL ABSTRACTS

The American Dental Association has started publication of a unique new journal entitled "Dental Abstracts."

The new monthly, the only one of its kind in the field, contains summaries of articles drawn from all of the important dental journals in the world. The first issue includes, in addition to material from English language journals translated material from articles originally printed in Italian, Spanish, Austrian, Swedish, German, Finnish, Russian, Dutch, Czechoslovakian and French.

The annual subscription price is $6 in the United States and $7 outside the country.

Prior to publication of the first issue, nearly 8,000 requests for subscriptions were received, according to Dr. Lon W. Morrey, of Chicago, A.D.A. editor.

In addition to dental literature, periodicals of allied health professions will be reviewed for articles of particular interest to dentists.

Dr. Morrey said that Dental Abstracts will have a dual purpose: (1) to provide in a short reading period each month a survey of dental progress throughout the world; (2) to give readers enough information so that they can determine whether they need to read the original article in its entirety.

"More than 2,000 dental articles are published throughout the world each month making it impossible for anyone to keep abreast of all the important contributions to the literature," he pointed out.

"Those who must have a knowledge of one or more fields in dentistry—whether they be practitioner, research worker, educator, technician, or manufacturer—will find Dental Abstracts the answer to a long-standing need.

"It will provide an over-all view of world dental literature, and at the same time it will allow the busy practitioner to use his time and his reading energy in the most productive manner possible," Dr. Morrey said.

Subscriptions may be obtained by writing the American Dental Association Subscription Department, 222 E. Superior St., Chicago 11, Ill.

DR. DANIEL PRESCOTT MOWRY

Daniel Prescott Mowry, D.D.S., F.A.C.D., F.D.S.R.C.S., (Eng.), Dean of the Faculty of Dentistry of McGill University died on August 2, 1955, after a lengthy illness. His death is a great and tragic loss to this Faculty, to the dental profession and to the field of dental education.

Doctor Mowry was associated with the Faculty of Dentistry of McGill University for many years in research and teaching in periodontology and was appointed Dean of the Faculty on August 1, 1948. In accepting this post and devoting all his time to teaching and administration, he gave up a highly successful specialist practice from a deep sense of idealism and devotion to the dental profession and McGill University. In the field of periodontology he was a pioneer and one of the original members of the American Academy of Periodontology. He was held in high esteem both by his patients and colleagues for his knowledge and skill. He gave generously of his time, contributing articles to professional journals and appearing before many societies in Canada and the United States of America as lecturer and clinician.

He was president on two occasions, of the Montreal Dental Club and of the Board of Governors of the College of Dental Surgeons of the Province of Quebec. His interests were many and varied. He was a past president and an active member of the St. James Literary Society, contributing to its programme with essays on a wide range of subjects. He served on the Board of Sir George Williams College and on the Council of the City of Montreal. He was a founder and past president of the Montreal Light Aeroplane Club. He was elected a fellow of the American Academy of Dental Medicine.

To all his activities he brought a keen analytical mind, boundless energy, prompt action, loyalty and administrative ability. His enthusiasm was an inspiration. Without effort on his part he gained the love and respect of those who were privileged to know him and to serve with him.

He was deeply concerned with the new McGill University dental clinic in the new Montreal General Hospital. The welfare of the dental students and their training facilities were uppermost in his mind and he was responsible for initiating the much needed remodelling of the dental technical laboratories by the University. It is indeed tragic that he was not spared to participate in the opening of these new sections.

Whereas: Dean Daniel Prescott Mowry was respected and beloved by the members of this Faculty and his staff of teachers; and

Whereas: his leadership, interest, loyalty and inspiration will be sadly missed by this Faculty; and

Whereas: this Faculty of Dentistry of McGill University does mourn his death with deep emotion and sense of personal loss,

Be it therefore resolved that these resolutions be recorded in our minutes and a copy be sent with our deepest sympathy to his family.

(Resolutions adopted by the Faculty of Dentistry of McGill University)

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